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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706

1981 VOLUNTEER LAKE

MONITORING PROGRAM REPORT

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

CATHERINE LAKE, LAKE COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

Volunteers were trained by Public Participation Coordinators Carol Beim, Bob Hagele, William Hammel, Patrick McCarthy, Vanessa Musgrave, and Dawn Wrobel. Lake maps were prepared by J. W. Hammel and Bob Hagele. Lake assessment summaries were prepared by Patrick McCarthy.

Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

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Reports were typed by Word Processing under the direction of Norma Kraus and Diane Woodyard while Field Observations and Lake Assessment Summaries were typed by Betty Pennington, Lori Whalen, Karen Janssen, and Marilyn Budd.

INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Catherine Lake is a 147 acre glacial lake located in Lake County, 2 miles west of Antioch, Illinois. It is part of the Fox Chain of Lakes. Lake Catherine has a maximum depth of 42 feet, an average depth of 17 feet and a storage capacity of 2,455 acre-feet (Table 1).

Catherine Lake serves as a recreational lake, with very heavy usage in powerboating and waterskiing. Fishing is a heavy use, while swimming, rowboating, canoeing, and sailboating are considered moderate uses. Access is unlimited, but a fee is charged.

The 757,760 acre watershed of Catherine Lake is estimated to be 40 percent residential. The lake shoreline is also primarily residential.

Algal blooms and water level fluctuations are considered moderate problems for Catherine Lake. Fertilizer and pesticides from lawns/golf courses are cited as the major pollution source.

Assessment information on Catherine Lake was provided by Gary Berkebile, the Illinois State Water Survey (1977) and the Illinois Department of Conservation (1977). Monitoring was performed by Gary Berkebile. Secchi disc depth, total depth, and field observations were recorded at three sites located in Figure 1 on six dates in 1981.

TABLE 1. LAKE ASSESSMENT SUMMARY, CATHERINE LAKE, LAKE COUNTY, ILLINOIS (RT-B01-D).

I. GENERAL INFORMATION

River Basin: Fox
Segment: B01

Ownership: public

Surface Area (Acres): 147*
Watershed Area (Acres): 757,760*
Maximum Depth (Feet): 42*
Average Depth (Feet): 16.7*
Storage Capacity (Acre/Feet): 2458*
Inflowing Stream(s):
Outflowing Stream(s):
Water Retention Time:
Lake Type: Glacial
Year Constructed:

II. USAGE

Public Access: yes
Lake Usage:
- Potable Water Supply: none
- Industrial Water Supply: none
- Agricultural Water Supply: none
- Cooling Water: none
- Recreation: very heavy
  - Fishing: heavy
  - Swimming: moderate
  - Power Boating: very heavy
  - Row Boating or Canoeing: moderate
  - Sailboating: moderate
  - Camping: light
  - Picnicking: light
  - Waterfowl Hunting: light
  - Waterfowl Observation: light
  - Other: water-skiing: very heavy

Recreational Facilities:
3 fee charge boat liveries, several private beaches

Shoreline Usage (Percent):
- Urban (Including Streets):
- Residential (Including Lawns): 98*
- Golf Courses:
- Pasture or Grassland:
- Woodland:
- Row Crops:
- Wetland:
- Other: 2*

Watershed Usage (Percent):
- Urban:
- Residential: 40*
- Golf Courses:
- Pasture or Grassland:
- Woodland: 5%**
- Row Crops: 50%**
- Wetland: 5%**
- Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: fair
Fishing: good
Conditions and Extent:
- Suspended Sediment: moderate (minimal*)
- Deposition of Sediment: large
- Algal Blooms: minimal (moderate*)
- Aquatic Weeds: slight
- Taste and/or Odor: minimal
- Water Level Fluctuation: (moderate**)
- Fishkills: minimal
- Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
- Sewage Treatment Plant Effluent:
- Industrial Discharge:
- Urban Storm Drainage:
- Septic Tanks:
- Pasture or Grassland Runoff:
- Cropland Runoff:
- Feedlot Runoff:
- Construction Site Runoff:
- Fertilizer or Pesticides from Lawns/Golf Courses: yes
- Orchards:
- Forestry Operations Runoff:
- Mining:
- Waterfowl:
- Sediment in Lake:
- Other:

V. LAKE MANAGEMENT

Comments: Property Owners Assoc. plans to kill weeds when water temp. reaches 65%, Areator installed, 1979*

Information Supplied By Gary Berkebile (1981); *Illinois State Water Survey (1977); **Illinois Department of Conservation(1977)

FIGURE 1

CATHERINE LAKE

LAKE COUNTY

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Catherine Lake are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Catherine Lake

The average Secchi disc transparency of Catherine Lake was 54.0 inches, which ranked number 18 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was greater than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was above average for Illinois lakes.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Catherine Lake ranged from a minimum of 42 inches to a maximum of 90 inches at Site 3 on August 22.

The clarity of Catherine Lake was relatively uniform at all three sites. Transparency averaged 55.0 inches, 54.0 inches and 53.0 inches at Sites 1, 2, and 3, respectively. Secchi readings were below the four feet minimum recommended for swimming on one of the six sampling days at Site 1 (June 14); on two of the six sampling days at Site 2 (June 14 and August 28); and on three of the six sampling days at Site 3 (June 14, 28 and August 8).

Since Secchi readings were not taken in July, September and October, seasonal trends in the transparency of Catherine Lake could not be completely defined. Lowest transparencies were found on June 14 and were probably the result of algal blooms. The green water color observed on most of the sampling dates indicate that the transparency of Catherine Lake was influenced primarily by the presence of algae.

An aerator was installed near Site 3 in Catherine Lake near Site 3 by the Illinois State Water Survey in 1979. Chemicals for the control of algae are added to the lake through this aerator. A substantial increase in clarity was observed between August 8 (average transparency 44 inches) and August 22 (average transparency 86 inches) following about three weeks of aeration.

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) CATHERINE/LAKE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 9	48.0	48.0	48.0	48.0	0.0
05/ 24	60.0	60.0	54.0	58.0	3.5
06/ 14	42.0	42.0	42.0	42.0	0.0
06/ 28	48.0	48.0	42.0	46.0	3.5
08/ 8	48.0	42.0	42.0	44.0	3.5
08/ 22	84.0	84.0	90.0	86.0	3.5

SUMMARY STATISTICS

	SITES			LAKE
MEAN	55.0	54.0	53.0	54.0
STD DEV	15.4	16.1	18.8	15.8
MIN	42.0	42.0	42.0	42.0
MAX	84.0	84.0	90.0	90.0
AV DEPTH	36.7	31.2	23.9	

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) CATHERINE/LAKE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 9	36.0	30.0	22.0	29.3	7.0
05/ 24	37.0	34.0	26.0	32.3	5.7
06/ 14	37.0	31.0	24.5	30.8	6.3
06/ 28	37.0	32.0	25.0	31.3	6.0
08/ 8	36.0	30.0	23.0	29.7	6.5
08/ 22	37.0	30.0	23.0	30.0	7.0

SUMMARY STATISTICS

	SITES			LAKE
MEAN	36.7	31.2	23.9	30.6
STD DEV	0.5	1.6	1.5	5.5
MIN	36.0	30.0	22.0	22.0
MAX	37.0	34.0	26.0	37.0
AV DEPTH	36.7	31.2	23.9	

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) CATHERINE/LAKE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

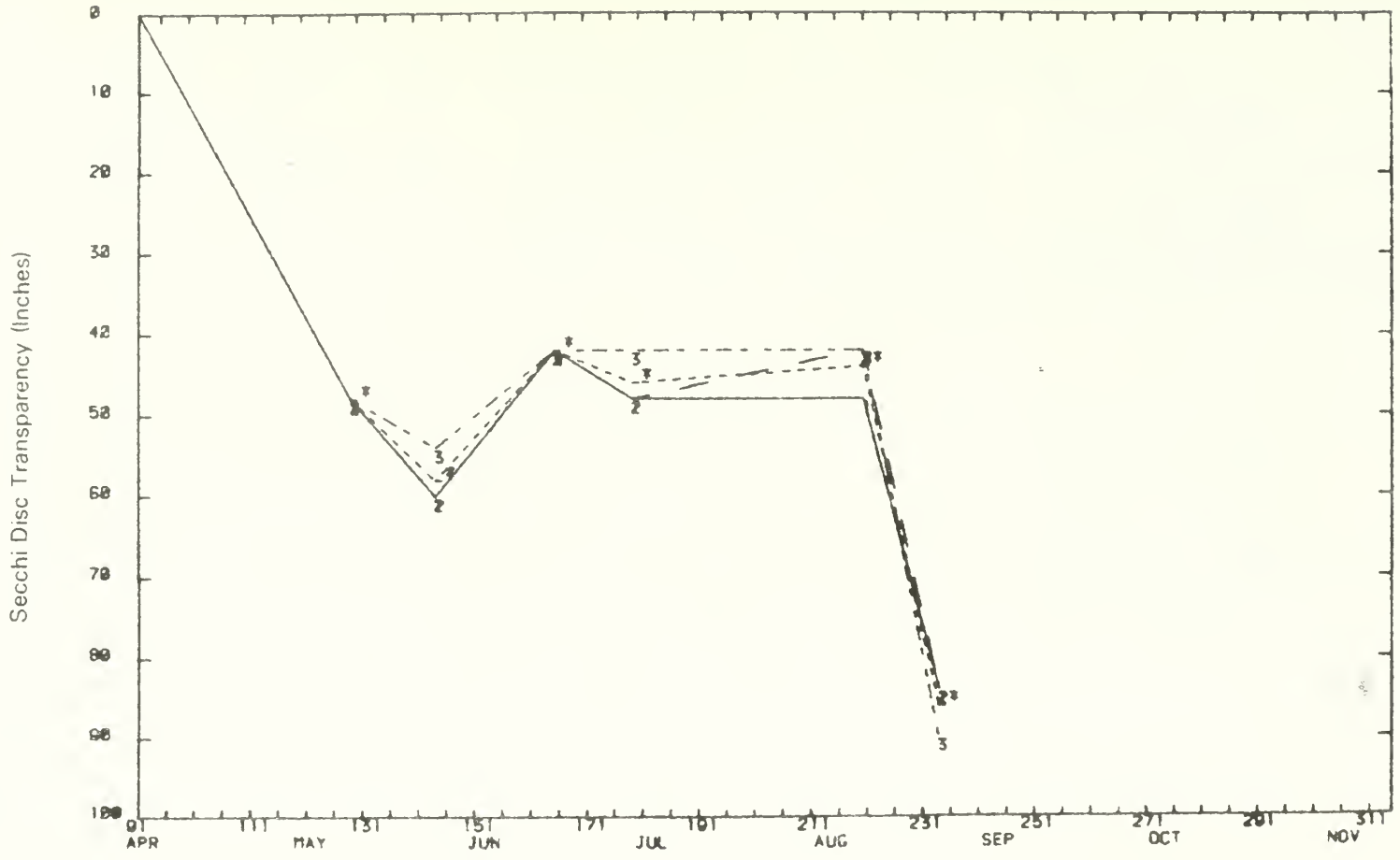


TABLE 1 FIELD OBSERVATIONS, CATHERINE LAKE, LAKE COUNTY, ILLINOIS

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
[illegible]	WATER COLOR:	brnsh-grn	[illegible]	[illegible]
	SEDIMENT:	moderate	moderate	moderate
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR.	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	[illegible]
PRECIPITATION:	no rain	[illegible]
WAVES:	ripple	
AIR TEMPERATURE:	warm	[illegible]
WIND DIRECTION:	ESE	

OBSERVATIONS MADE BY: Gary Berkebile

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: [illegible] boating

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/24/81	WATER COLOR:	grn-brn	grn-brn	grn-brn
	SEDIMENT:	moderate	moderate	moderate
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	overcast
PRECIPITATION:	no rain	moderate
WAVES:	moderate	white caps
AIR TEMPERATURE:	warm	cool
WIND DIRECTION:	S	SW

OBSERVATIONS MADE BY: Gary Berkebile

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, power boating, waterskiing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/14/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	large	large	large
	ALGAE:	moderate	moderate	moderate
	WEEDS AT SAMPLE SITE:	moderate	moderate	moderate
	WEEDS NEAR SHORE:	moderate	moderate	moderate
	OTHER SUBSTANCES:	refuse	refuse	refuse
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	overcast
PRECIPITATION:	mod. rain	heavy rain
WAVES:	white caps	white caps
AIR TEMPERATURE:	hot	warm
WIND DIRECTION:	SW	SW

OBSERVATIONS MADE BY: Gary K. Berkebile

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: fishing, power boating, waterskiing, sailing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/28/81	WATER COLOR:	grnsh-brn	grnsh-brn	grnsh-brn
	SEDIMENT:	moderate	moderate	moderate
	ALGAE:	slight	slight	slight
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	large	large	large
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	hazy	overcast
PRECIPITATION:	no rain	v. lt. rain
WAVES:	white caps	white caps
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	S	S

OBSERVATIONS MADE BY: Gary K. Berkebile

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: fishing, swimming, power boating, waterskiing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

TABLE 4. FIELD OBSERVATIONS, CATHERINE LAKE, LAKE COUNTY, ILLINOIS

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/8/81	WATER COLOR:	lt. green	lt. green	mod. green	CLOUD COVER:	many clouds	overcast	WATER LEVEL OF LAKE:
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	no rain	mod. rain	RECREATIONAL USAGE: fishing, power boating, waterskiing
	ALGAE:	moderate	moderate	moderate	WAVES:	moderate	white caps	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	large	large	large	WIND DIRECTION:	N	NW	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	none	none				
					OBSERVATIONS MADE BY: Gary Berkebile			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/22/81	WATER COLOR:	mod. green			CLOUD COVER:	overcast	clear	WATER LEVEL OF LAKE: normal
	SEDIMENT:	large			PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, swimming, power boating, waterskiing
	ALGAE:	large			WAVES:	ripple	calm	
	WEEDS AT SAMPLE SITE:	minimal			AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	large			WIND DIRECTION:	NW	NW	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	oil films						
					OBSERVATIONS MADE BY: Gary Berkebile			ADDITIONAL COMMENTS: They have been aerating the lake for 3 wks. & there has been a dramatic change in water clarity. (near site #3)
	ODOR:	no odor						

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Catherine Lake (estimated at twice the Secchi depth) ranged from 7.0-14.0 feet at Site 1, from 7.0-14.0 feet at Site 2, and from 7.0-15.0 feet at Site 3. Since Catherine Lake is deep enough to thermally stratify and had a euphotic zone that was generally less than the total depth, low dissolved oxygen values would be expected in the bottom waters when the aerator is not in operation.

In the absence of dissolved oxygen, undesirable substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese may accumulate in the bottom waters. When these substances are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, taste and odor, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Catherine Lake, part of the Fox Chain of Lakes in northeastern Illinois, was sampled on six dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Gary Berkebile recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Catherine Lake (54.0 inches) ranked 18th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was greater than the four feet minimum recommended for swimming by the Department of Public Health and was above average for Illinois lakes.

Catherine Lake is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification. In recognition of this, an aerator has been installed in the lake.

Catherine Lake is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Information on lake water levels is important for determining lake management strategies. Installation of a simple, but accurate, water level measuring device and frequent recording of lake water levels is recommended.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from septic tanks, fertilization of lawns, and waterfowl should also be investigated and minimized.

Continued in-lake management is recommended. Aeration-destratification may continue to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem-causing blue-greens, reduce the need for copper sulfate, alleviate odor problems, and improve fishing.

Continued monitoring is recommended for Catherine Lake. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

Illinois Department of Conservation. 1977. Illinois Inland Lakes Problems Assessment Data Form, filled out for Illinois Environmental Protection Agency, "Assessment and Classification of Illinois Lakes."

Illinois Department of Public Health. 1976. The Minimum Sanitary Requirements for the Design and Operation of Swimming Pools and Bathing Beaches. State of Illinois, Department of Public Health, Springfield, Illinois.

Illinois Environmental Protection Agency. 1982. Volunteer Lake Monitoring, 1981. A Cooperative Citizen - Illinois Environmental Protection Agency project. Monitoring Unit; Division of Water Pollution Control, Illinois EPA, Springfield, Illinois.

Illinois State Water Survey. 1924-1981. Lake Sedimentation Surveys. Hydrology Section, Illinois State Water Survey, Urbana, Illinois.

DS:jab/sp3891C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

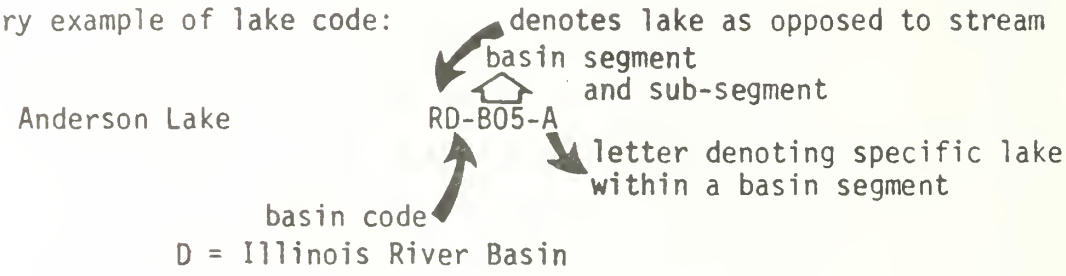
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

LAKE CARLYLE, CLINTON COUNTY, ILLINOIS

A Cooperative Citizen-
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Carlyle Lake is a 26,000 acre impoundment owned by the United States Army Corps of Engineers. It is located in Clinton, Bond and Fayette Counties, 1 mile north of Carlyle, Illinois. It has a maximum depth of 40 feet, an average depth of 10.9 feet, and a storage capacity of 283,000 acre-feet at summer pool (Table 1).

Carlyle Lake serves as a potable water supply for several municipalities surrounding it. Recreational uses include very heavy sailboating pressure, camping, picnicking and waterfowl hunting and observation. Fishing, swimming, waterskiing and power boating contribute moderate usage pressure. Access is available from various public use recreation areas.

The 1,738,880 acre watershed of Lake Carlyle is 79% cropland. The lake shoreline is primarily pasture or grassland. Suspended sediment, deposition of sediment, and water level fluctuation are considered moderate problems. Sewage treatment plant effluent, industrial discharge, urban storm drainage, septic tanks, pasture, grassland, cropland, feedlot, and construction site runoff, fertilizer or pesticides from lawns/golf courses, orchards, waterfowl and sediment in the lake are cited as potential pollution sources. This numerous list reflects the size of the watershed.

TABLE 1. LAKE ASSESSMENT SUMMARY, CARLYLE LAKE, CLINTON, BOND AND FAYETTE COUNTIES, ILLINOIS (RD-B04-A)

I. GENERAL INFORMATION

River Basin: Kaskaskia
Segment: B04

Ownership: U.S. Army Corps of Engineers

Surface Area (Acres): 26,000*
Watershed Area (Acres): 1,738,880**
Maximum Depth (Feet):40
Average Depth (Feet):10.9*
Storage Capacity (Acre/Feet): 283,000*
Inflowing Stream(s): Kaskaskia Hurricane, Coles
Outflowing Stream(s): Kaskaskia R.
Water Retention Time:0.175 years
Lake Type: Dammed Stream
Year Constructed: 1967

II. USAGE

Public Access: Yes
Lake Usage:
Potable Water Supply: moderate
Industrial Water Supply: light
Agricultural Water Supply: light
Cooling Water: none
Recreation:
Fishing: moderate
Swimming: moderate
Power Boating: moderate
Row Boating or Canoeing: light
Sailboating: very heavy
Camping: heavy
Picnicking: heavy
Waterfowl Hunting: heavy
Waterfowl Observation: heavy
Other: water skiing moderate
flood control

Recreational Facilities:
beach, trails, concession; boat launches, harbors, Environmental study visitor center.

Shoreline Usage (Percent):
Urban (Including Streets):
Residential (Including Lawns):
Golf Courses:
Pasture or Grassland: 60
Woodland: 30
Row Crops:
Wetland: 10
Other:

Watershed Usage (Percent):
Urban:
Residential:
Golf Courses:
Pasture or Grassland: 9%**
Woodland: 9%**
Row Crops: 79%
Wetland:
Other: 3%

III. WATER QUALITY AND PROBLEMS

General Water Quality: good
Fishing: good
Conditions and Extent:
Suspended Sediment: moderate
Deposition of Sediment: moderate
Algal Blooms: slight
Aquatic Weeds: minimal
Taste and/or Odor: minimal
Water Level Fluctuation: moderate
Fishkills: minimal
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
Sewage Treatment Plant Effluent: yes
Industrial Discharge: yes
Urban Storm Drainage: yes
Septic Tanks: yes
Pasture or Grassland Runoff: yes
Cropland Runoff: yes
Feedlot Runoff: yes
Construction Site Runoff: yes
Fertilizer or Pesticides from Lawns/Golf Courses: yes
Orchards: yes
Forestry Operations Runoff: no
Mining: no
Waterfowl: yes
Sediment in Lake: yes
Other:

V. LAKE MANAGEMENT

Comments:

Information Supplied By Daniel J. Nack (1981);* U.S. Army Corps of Engineers (1975)
**Illinois State Water Survey (1977)

Assessment information on Carlyle Lake was provided by Daniel J. Nack, the U.S. Army Corps of Engineers, and the Illinois State Water Survey. Monitoring was performed by Daniel J. Nack. Secchi disc depth, total depth, and field observations were recorded at three headwater sites (located in Fig. 1) on twelve dates in 1981.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Carlyle Lake are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Carlyle Lake

The Secchi transparency of the headwaters of Carlyle Lake ranged from a minimum of 5 inches at Site 3 on June 2 and 17 to a maximum of 15 inches at Site 1 on October 2. Since all three sites were located approximately 6 miles or more upstream of the dam, the data collected at the three sites is probably not representative of the lake as a whole.

The average Secchi disc transparency of Carlyle Lake was 10.2 inches, which ranked number 79 when the average transparencies of volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was in the range generally associated with use impairment problems in Illinois lakes.

Spatial and Seasonal Differences in Transparency

As is typical of Illinois reservoirs, a spatial trend of decreasing transparency toward the headwaters was apparent in Carlyle Lake. The average transparencies of Sites 1, 2 and 3 were 12.4, 9.8, and 8.3 inches, respectively. All of the readings were below the four feet minimum recommended for swimming.

The lake headwaters were extremely turbid throughout the May-October sampling. Field observations indicated that the lack of transparency was primarily due to sediment, particularly at Site 3. This sediment load tends to settle out in the upper end of the lake so that the water becomes clearer as you progress down lake.

FIGURE 1

CARLYLE LAKE

FAYETTE & CLINTON COUNTIES

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) CARLYLE/CLINTON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 4	12.0	10.0	6.0	9.3	3.1
05/ 19	8.0	8.0	6.0	7.3	1.2
06/ 2	8.0	6.0	5.0	6.3	1.5
06/ 17	13.0	6.0	5.0	8.0	4.4
07/ 10	14.0	13.0	13.0	13.3	0.6
07/ 17	13.0	13.0	11.0	12.3	1.2
08/ 3	14.0	10.0	9.0	11.0	2.6
08/ 21	12.0	6.0	-1.0	9.0	4.2
09/ 1	14.0	9.0	8.0	10.3	3.2
09/ 21	12.0	10.0	10.0	10.7	1.2
10/ 2	15.0	12.0	6.0	11.0	4.6
10/ 21	14.0	14.0	12.0	13.3	1.2

SUMMARY STATISTICS

	SITES			LAKE
MEAN	12.4	9.8	8.3	10.2
STD DEV	2.3	2.9	2.9	3.1
MIN	8.0	6.0	5.0	5.0
MAX	15.0	14.0	13.0	15.0
AV DEPTH	9.3	21.9	18.2	

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) CARLYLE/CLINTON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 4	7.5	21.0	11.0	13.2	7.0
05/ 19	10.0	22.0	11.0	14.3	6.7
06/ 2	11.0	23.0	11.5	15.2	6.8
06/ 17	9.0	22.0	12.0	14.3	6.8
07/ 10	9.5	23.0	9.0	13.8	7.9
07/ 17	9.0	21.0	9.0	13.0	6.9
08/ 3	9.5	22.5	10.5	14.2	7.2
08/ 21	9.0	21.0	-1.0	15.0	8.5
09/ 1	9.0	21.0	10.0	13.3	6.7
09/ 21	8.5	22.0	8.0	12.8	7.9
10/ 2	10.0	22.0	9.0	13.7	7.2
10/ 21	10.0	22.5	11.0	14.5	6.9

SUMMARY STATISTICS

	SITES			LAKE
MEAN	9.3	21.9	10.2	13.9
STD DEV	0.9	0.8	1.3	6.0
MIN	7.5	21.0	8.0	7.5
MAX	11.0	23.0	12.0	23.0
AV DEPTH	9.3	21.9	10.2	

-1 = missing value

See glossary for explanation of Summary Statistics

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) CARLYLE/CLINTON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

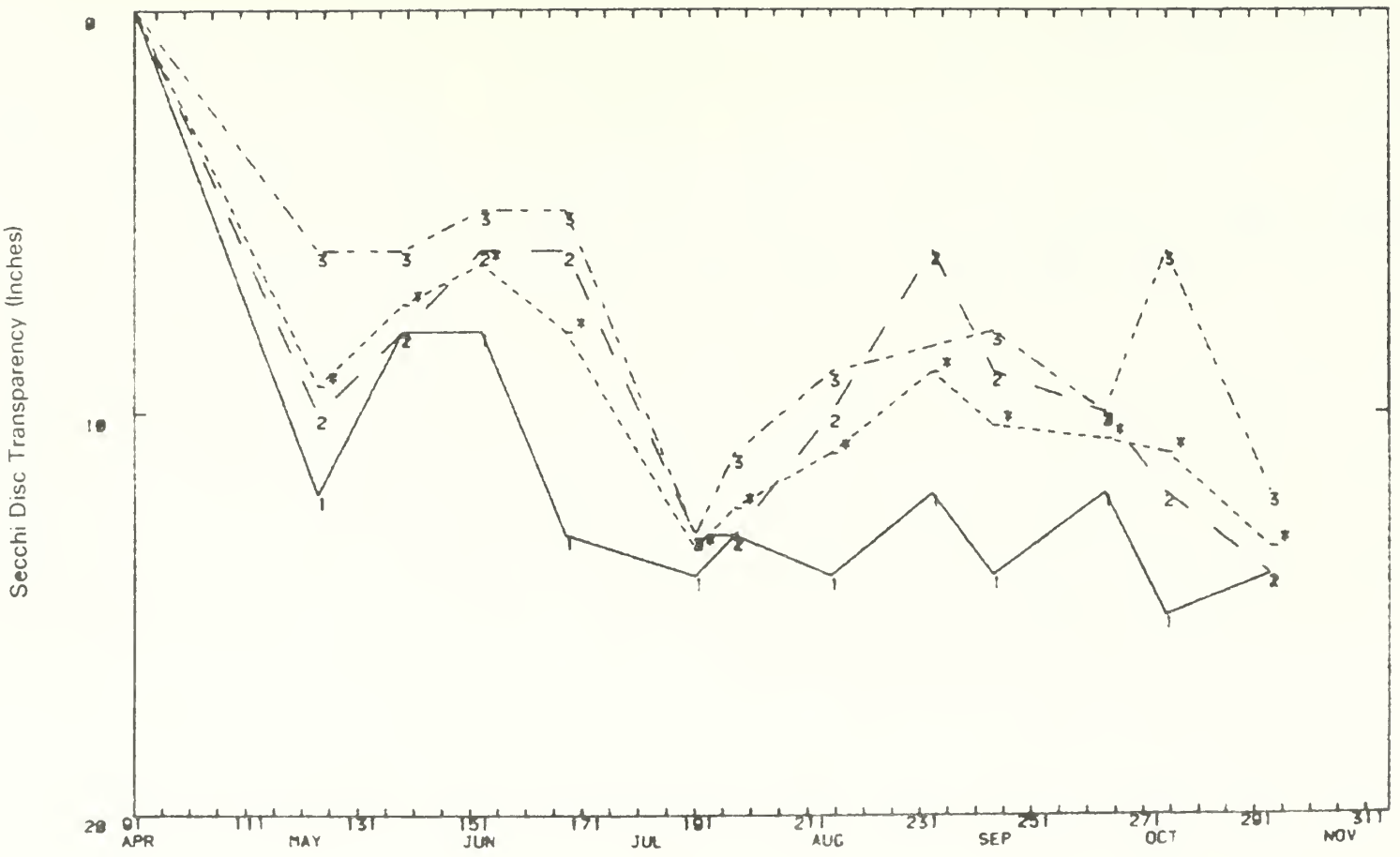


TABLE 4. FIELD OBSERVATIONS, CARLYLE LAKE, CLINTON, FAYETTE COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/4/81	WATER COLOR:	lt. green	lt. green	lt. green
	SEDIMENT:	moderate	moderate	large
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	clear
PRECIPITATION:	no rain	no rain
WAVES:	moderate	white caps
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	SW	SW
OBSERVATIONS MADE BY:	Dan Nack Bill Hammel	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, power boating

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/19/81	WATER COLOR:	lt. brown	lt. brown	mod. brown
	SEDIMENT:	moderate	moderate	large
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	overcast
PRECIPITATION:	no rain	heavy rain
WAVES:	moderate	white caps
AIR TEMPERATURE:	cool	cool
WIND DIRECTION:	NE	NE
OBSERVATIONS MADE BY:	Daniel J. Nack	

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 12"
RECREATIONAL USAGE: fishing, power boating

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/2/81	WATER COLOR:	lt. brown	lt. brown	mod. brown
	SEDIMENT:	moderate	moderate	large
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	*	*	*
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	many clouds
PRECIPITATION:	no rain	heavy rain
WAVES:	calm	white caps
AIR TEMPERATURE:	warm	very hot
WIND DIRECTION:		
OBSERVATIONS MADE BY:	Daniel J. Nack	

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 1' 9"
RECREATIONAL USAGE: fishing, swimming, power boating

LAKE MANAGEMENT:

ADDITIONAL COMMENTS: Saw tornado yesterday 1:30 PM traveling S. to N. with funnel at base about 100 yd up to clouds approx. 1000 ft. elevation for 5-10 min

*Few logs, trees & brush floating

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/17/81	WATER COLOR;	lt. brown	lt. brown	mod. brown
	SEDIMENT:	moderate	moderate	large
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	large	large	large
	OTHER SUBSTANCES:	duckweed	dead fish	logs
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	many clouds
PRECIPITATION:	no rain	lt. rain
WAVES:	calm	moderate
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	SW	W
OBSERVATIONS MADE [illegible]:	Daniel J. Nack	

OTHER COMMENTS

WATER LEVEL OF LAKE: Less than 6" above normal
RECREATIONAL USAGE: fishing, swimming, power boating, waterskiing, sailing, camping, picnicking

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

TABLE 4 FIELD OBSERVATIONS, CARLYLE LAKE, BOND & CLINTON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
7/10/81	WATER COLOR:	lt. green	mod. green	very green	CLOUD COVER:	clear	few clouds	WATER LEVEL OF LAKE: above normal 3"
	SEDIMENT:	slight	moderate	moderate	PRECIPITATION:	no rain	v. lt. rain	RECREATIONAL USAGE: fishing, swimming
	ALGAE:	minimal	slight	moderate	WAVES:	ripple	moderate	power boating
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	hot	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	N-6mph	N	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	algal col.	algal col.				
					OBSERVATIONS MADE BY:	Daniel J. Nack		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	fishy				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
7/17/81	WATER COLOR:	lt. green	lt. green	mod. green	CLOUD COVER:	hazy	hazy	WATER LEVEL OF LAKE: about normal
	SEDIMENT:	slight	moderate	large	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, swimming,
	ALGAE:	minimal	minimal	slight	WAVES:	ripple	ripple	power boating
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	N-NW	N-NW	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	dead fish	none	none				
					OBSERVATIONS MADE BY:	Daniel J. Nack		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	fishy				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/3/81	WATER COLOR:	lt. green	lt. green	mod. green	CLOUD COVER:	overcast	clear	WATER LEVEL OF LAKE: above normal 21"
	SEDIMENT:	slight	slight	moderate	PRECIPITATION:	v. lt. rain	no rain	RECREATIONAL USAGE: power boating
	ALGAE:	minimal	minimal	minimal	WAVES:	small	calm	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	S-6 mph	S-6 mph	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	logs	logs	logs				
		dead tree	dead tree	dead tree	OBSERVATIONS MADE BY:	Daniel J. Nack		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/21/81	WATER COLOR:	lt. green	lt. green	grnsh-brn	CLOUD COVER:	clear	clear	WATER LEVEL OF LAKE: below normal 3"
	SEDIMENT:	moderate	moderate	large	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, swimmi
	ALGAE:	minimal	minimal	minimal	WAVES:	calm	calm	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	none	none				
					OBSERVATIONS MADE	Daniel J. Nack		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

TABLE 4. FIELD OBSERVATIONS, CARLYLE LAKE, BOND/CLINTON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/1/81	WATER COLOR:	lt. green	mod. green	grnsh-br.	CLOUD COVER:	many clouds	many clouds	WATER LEVEL OF LAKE: Approximately 8" above normal.
	SEDIMENT:	minimal	slight	moderate	PRECIPITATION:	moderate rain	moderate rain	RECREATIONAL USAGE: fishing, swimming and power boating
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple waves	small waves	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	N	N	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	dead fish	none	other: logs & dead timber	OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/21/81	WATER COLOR:	lt. green	mod. green	mod. green	CLOUD COVER:	clear	clear	WATER LEVEL OF LAKE: normal
	SEDIMENT:	slight	moderate	moderate	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, power boating
	ALGAE:	minimal	minimal	minimal	WAVES:	white caps	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	S-SE	S-SE	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	logs	logs	logs	OBSERVATIONS MADE BY:	Daniel J. Nack		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/2/81	WATER COLOR:	lt. green	mod. green	mod. green	CLOUD COVER:	few clouds	many clouds	WATER LEVEL OF LAKE: above normal
	SEDIMENT:	minimal	slight	moderate	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, power boating
	ALGAE:	minimal	minimal	minimal	WAVES:	white caps	white caps	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	N-NW	NW	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	logs	logs	logs	OBSERVATIONS MADE BY:	Daniel J. Nack		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/21/81	WATER COLOR:	lt. green	lt. green	mod. green	CLOUD COVER:	clear	clear	WATER LEVEL OF LAKE: above normal 7"
	SEDIMENT:	slight	slight	moderate	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, power boating
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	SW	SW	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	none	logs	OBSERVATIONS MADE BY:	Daniel J. Nack		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Carlyle Lake (estimated at twice the Secchi depth) ranged from 1.3-2.5 feet at Site 1, from 1.0-2.3 feet at Site 2, and from 0.8-2.2 feet at Site 3. Since the sites were relatively shallow and the lake is so big, it may not thermally stratify and the bottom waters may be aerated by wind or wave activity.

SUMMARY AND RECOMMENDATIONS

Summary

Carlyle Lake, a multi-purpose impoundment in south-central Illinois which was constructed by the Corps of Engineers, was sampled on twelve dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Daniel J. Nack recorded Secchi disc transparency, total depth, and field observations at three sites located in the lake headwaters and reported results to the Illinois EPA.

The average Secchi disc transparency of the headwaters of Carlyle Lake (10.2 inches) ranked 79th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was less than the four feet minimum recommended for swimming by the Department of Public Health and was in the range generally associated with use impairment problems in Illinois lakes. Since all sampling sites were in the upper end of the lake, this data is not representative of the lake as a whole.

Field observations indicated lowest transparencies in May and early June. Carlyle Lake was very turbid throughout the sampling period; above normal rainfall during this time may have contributed to a lower than normal transparency. Field observations indicated the transparency was influenced primarily by sediment.

Carlyle Lake is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of weed and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of portions of the lake shoreline by riprap or some other means may also reduce sediment input. Pollutant contributions from sewage treatment plant effluent, urban storm drainage, septic tanks, fertilization of lawns, and waterfowl should also be investigated and minimized.

Continued monitoring is recommended for Carlyle Lake. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

Illinois Department of Conservation. 1977. Illinois Inland Lakes Problems Assessment Data Form, filled out for Illinois Environmental Protection Agency, "Assessment and Classification of Illinois Lakes."

Illinois Department of Public Health. 1976. The Minimum Sanitary Requirements for the Design and Operation of Swimming Pools and Bathing Beaches. State of Illinois, Department of Public Health, Springfield, Illinois.

Illinois Environmental Protection Agency. 1982. Volunteer Lake Monitoring, 1981. A Cooperative Citizen - Illinois Environmental Protection Agency project. Monitoring Unit; Division of Water Pollution Control, Illinois EPA, Springfield, Illinois.

Illinois State Water Survey. 1924-1981. Lake Sedimentation Surveys. Hydrology Section, Illinois State Water Survey, Urbana, Illinois.

DS:jab/sp2161c

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

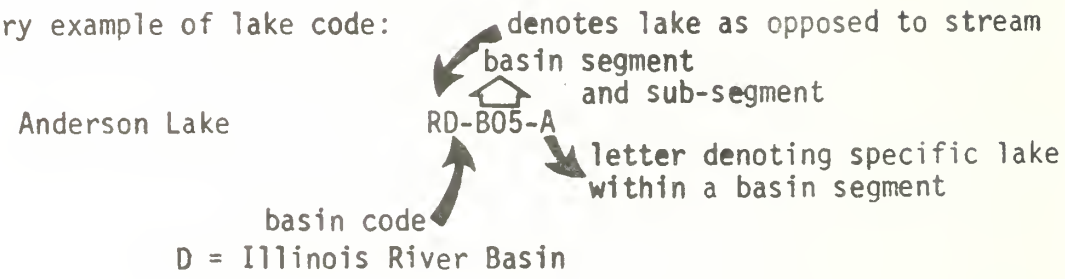
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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LAKE CANTON, FULTON COUNTY, ILLINOIS

A Cooperative Citizen-
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by th Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Lake Canton is a 247 acre impoundment owned by the City of Canton, Fulton County, Illinois. It was constructed by the damming of the West Branch of Copperas Creek in 1939. The lake has a maximum depth of 33 feet, an average depth of 13 feet and a storage capacity of 3211 acre-feet (Table 1).

Lake Canton serves as a potable water supply for the City. Recreational uses associated with the lake include fishing, swimming, power boating, waterskiing, rowboating, or canoeing and sailboating. Access is free and unlimited.

The 9,659 acre watershed of Lake Canton is estimated to be 60% row crops. The lake shoreline is primarily wooded.

Suspended sediment, deposition of sediment, algal blooms, taste and odor, and water level fluctuation are considered moderate problems for Lake Canton. Urban storm drainage, septic tanks, pasture or grassland runoff, cropland runoff, fertilizer or pesticides from lawns/golf courses and mining are cited as potential pollution sources.

TABLE 1. LAKE ASSESSMENT SUMMARY, CANTON LAKE, FULTON COUNTY, ILLINOIS (RD-B05-D).

I. GENERAL INFORMATION

River Basin: Illinois
Segment: B05

Ownership: City of Canton

Surface Area (Acres): 247
Watershed Area (Acres): 9659
Maximum Depth (Feet): 33
Average Depth (Feet): 13
Storage Capacity (Acre/Feet): 3211
Inflowing Stream(s): Copperas Creek (West Branch)
Outflowing Stream(s): Copperas Creek (West Branch)
Water Retention Time: 0.5 year
Lake Type: dammed stream
Year Constructed: 1939; dam raised 2' in 1972

II. USAGE

Public Access: yes
Lake Usage:
- Potable Water Supply: heavy
- Industrial Water Supply: none
- Agricultural Water Supply: none
- Cooling Water: none
- Recreation:
  - Fishing: moderate
  - Swimming: moderate
  - Power Boating: moderate
  - Row Boating or Canoeing: moderate
  - Sailboating: moderate
  - Camping: light
  - Picnicking: light
  - Waterfowl Hunting: light
  - Waterfowl Observation: light
  - Other: waterskiing - heavy

Recreational Facilities:
campgrounds, boat docks, picnic areas.

Shoreline Usage (Percent):
- Urban (Including Streets):
- Residential (Including Lawns): 25%
- Golf Courses:
- Pasture or Grassland: 30%
- Woodland: 45%
- Row Crops:
- Wetland:
- Other:

Watershed Usage (Percent):
- Urban:
- Residential: yes
- Golf Courses:
- Pasture or Grassland: 10%
- Woodland: 10%
- Row Crops: 60%
- Wetland:
- Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: excellent
Fishing: good
Conditions and Extent:
- Suspended Sediment: moderate
- Deposition of Sediment: moderate
- Algal Blooms: moderate
- Aquatic Weeds: minimal
- Taste and/or Odor: moderate
- Water Level Fluctuation: moderate
- Fishkills: minimal
- Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
- Sewage Treatment Plant Effluent:
- Industrial Discharge:
- Urban Storm Drainage: yes
- Septic Tanks: yes
- Pasture or Grassland Runoff: yes
- Cropland Runoff: yes
- Feedlot Runoff:
- Construction Site Runoff:
- Fertilizer or Pesticides from Lawns/Golf Courses: yes
- Orchards:
- Forestry Operations Runoff:
- Mining: yes
- Waterfowl:
- Sediment in Lake:
- Other:

V. LAKE MANAGEMENT

Comments: last applied $CuSO_4$ in 1962; and hope not to have to again; have started to rip rap shoreline.

Information Supplied By Raymond N. McKinney (1981)

Assessment information on Lake Canton was provided by Raymond N. McKinney, the Water Treatment Plant Operator. Monitoring was performed by Raymond N. McKinney, Robin Shirley and Steve White. Secchi disc transparency, total depth, and field observations were recorded at three sites (located in Fig. 1) on the following dates: May 15, May 15 and 29, June 3, July 16, August 15 and 31, September 10 and 30 and October 15 and 21, 1981.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Canton Lake are summarized in Table 2 and plotted in Fig. 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Lake Canton

The average Secchi disc transparency of Lake Canton was 23.3 inches, which ranked number 58 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was in the range generally associated with use impairment problems for Illinois lakes. Above average rainfall during the sampling season may have resulted in lower than normal transparency.

Spatial and Seasonal Differences in Transparency

The Secchi transparency of Lake Canton ranged from a maximum of 60 inches at Site 1 on July 16 to a minimum of 8 inches at Site 3 on August 15.

As is typical of Illinois reservoirs, a spatial trend of increasing transparency from the lake headwaters to the dam was apparent in Lake Canton. The average transparencies of Sites 3, 2 and 1 were 14.7, 22.5, and 32.8 inches, respectively.

The lake was turbid on all sampling dates except on July 16, when Site 1 had a Secchi reading of 60 inches. Field observations indicated that the lack of transparency was due primarily to suspended sediment,

FIGURE 1

CANTON LAKE

FULTON COUNTY

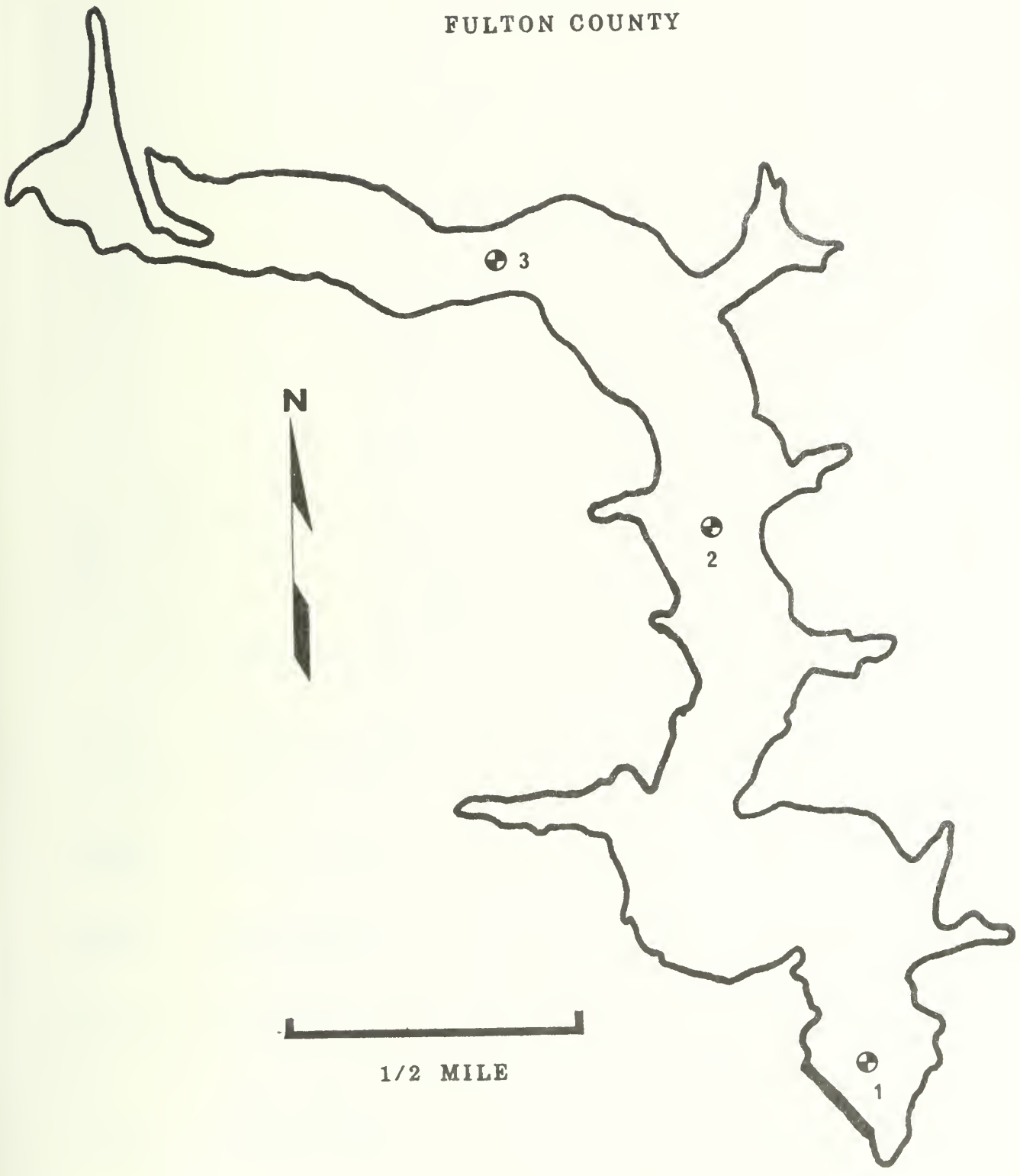


TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) CANTON/FULTON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
04/ 15	24.0	18.0	18.0	17.3	7.0
05/ 15	27.0	21.0	9.0	19.0	9.2
05/ 29	36.0	30.0	24.0	30.0	6.0
06/ 3	36.0	30.0	18.0	28.0	9.2
07/ 16	60.0	24.0	12.0	32.0	25.0
08/ 15	49.0	14.0	8.0	29.7	17.0
09/ 19	38.0	34.0	22.0	31.3	8.3
09/ 30	33.0	21.0	15.0	23.0	9.2
10/ 15	21.0	18.0	16.0	18.3	2.5
10/ 21	13.0	15.0	13.0	13.7	1.2

SUMMARY STATISTICS

	SITES			LAKE
MEAN	32.0	22.5	14.7	23.3
STD DEV	12.0	6.0	5.4	11.5
MIN	13.0	14.0	8.0	8.0
MAX	60.0	34.0	24.0	60.0
AV DEPTH	32.6	19.1	9.8	

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) CANTON/FULTON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
04/ 15	31.5	18.0	10.0	20.2	10.0
05/ 15	33.0	20.5	10.5	21.3	11.3
05/ 29	33.0	18.0	11.0	21.0	11.1
06/ 3	34.0	18.0	11.0	21.3	11.7
07/ 16	34.0	20.0	9.0	21.0	12.5
08/ 15	33.0	17.5	9.5	20.0	11.9
09/ 19	33.0	20.0	9.5	20.0	11.0
09/ 30	33.0	20.0	9.5	20.0	11.0
10/ 15	30.0	16.0	9.0	10.0	10.5
10/ 21	31.0	18.0	9.0	19.3	11.1

SUMMARY STATISTICS

	SITES			LAKE
MEAN	32.6	19.1	9.8	20.5
STD DEV	1.3	1.0	0.8	0.6
MIN	30.0	17.5	9.0	9.0
MAX	34.0	20.5	11.0	34.0
AV DEPTH	32.6	19.1	9.8	

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) CANTON/FULTON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

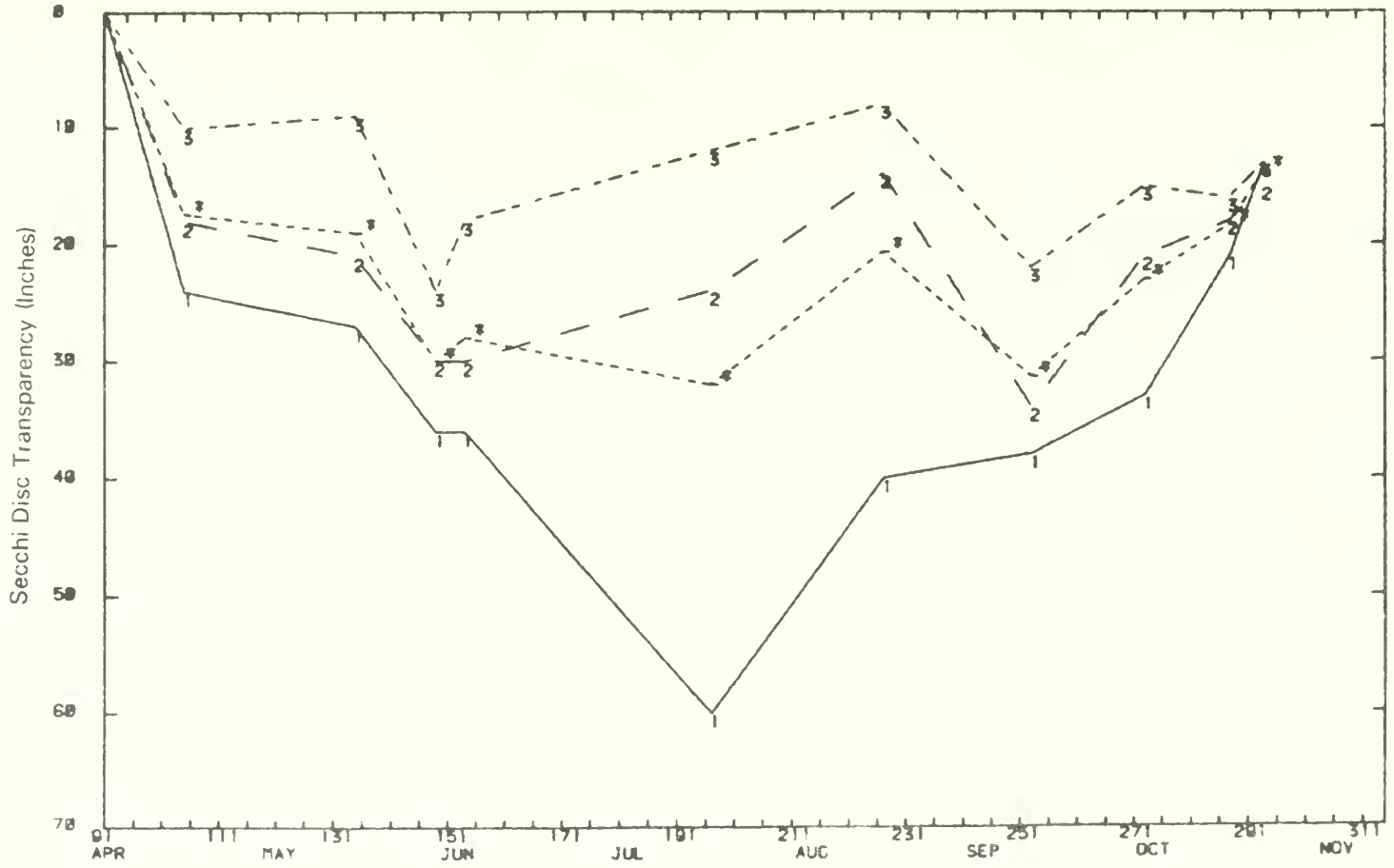


TABLE 4. FIELD OBSERVATIONS, CANTON LAKE, FULTON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
4/15/81	WATER COLOR:	brnsh-grn	brnsh-grn	mod. brown
	SEDIMENT:	moderate	moderate	large
	ALGAE:	slight	slight	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	waterfowl	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	overcast
PRECIPITATION:	no rain	moderate
WAVES:	ripple	white caps
AIR TEMPERATURE:	cool	cool
WIND DIRECTION:	SE	N
OBSERVATIONS MADE BY:	Raymond McKinney Robin Shirley	

OTHER COMMENTS	
WATER LEVEL OF LAKE:	normal
RECREATIONAL USAGE:	fishing
LAKE MANAGEMENT:	
ADDITIONAL COMMENTS:	

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/15/81	WATER COLOR:	brnsh-grn	brnsh-grn	lt. brown
	SEDIMENT:	moderate	moderate	moderate
	ALGAE:	moderate	moderate	moderate
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	many clouds
PRECIPITATION:	no rain	moderate
WAVES:		
AIR TEMPERATURE:	cool	cool
WIND DIRECTION:		
OBSERVATIONS MADE BY:	Raymond McKinney	

OTHER COMMENTS	
WATER LEVEL OF LAKE:	above normal
RECREATIONAL USAGE:	fishing
LAKE MANAGEMENT:	none since 1952
ADDITIONAL COMMENTS:	

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/29/81	WATER COLOR:	grnsh-brn	lt. green	brnsh-grn
	SEDIMENT:	slight	slight	moderate
	ALGAE:	slight	slight	slight
	WEEDS AT SAMPLE SITE:	slight	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	none	none	none
	ODOR:	fishy	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	hazy	hazy
PRECIPITATION:	no rain	no rain
WAVES:	calm	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	SW	SW
OBSERVATIONS MADE BY:	Raymond McKinney	

OTHER COMMENTS	
WATER LEVEL OF LAKE:	above normal 1"
RECREATIONAL USAGE:	fishing
LAKE MANAGEMENT:	none
ADDITIONAL COMMENTS:	

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/3/81	WATER COLOR;	grnsh-brn	grn-brn	brnsh-grn
	SEDIMENT:	slight	slight	moderate
	ALGAE:	moderate	slight	slight
	WEEDS AT SAMPLE SITE:	slight	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	algal col.	none	none
	ODOR:	fishy	none	none

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	many clouds
PRECIPITATION:	no rain	no rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	SW	SW
OBSERVATIONS MADE [illegible]:	Robin Shirley	

OTHER COMMENTS	
WATER LEVEL OF LAKE:	normal
RECREATIONAL USAGE:	fishing, power boating
LAKE MANAGEMENT:	none
ADDITIONAL COMMENTS:	

TABLE 4 FIELD OBSERVATIONS, LAKE CANTON, FULTON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
7/16/81	WATER COLOR:	lt. green	lt. green	grnsh-brn
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	slight	slight
	OTHER SUBSTANCES:	none	waterfowl	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	overcast
PRECIPITATION:	v. lt. rain	v. lt. rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	NE	S

OBSERVATIONS MADE BY: Robin S. Shirley

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/15/81	WATER COLOR:	lt. green	lt. brown	mod. brown
	SEDIMENT:	miniman	slight	moderate
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	many clouds
PRECIPITATION:	no rain	v. lt. rain
WAVES:	small	small
AIR TEMPERATURE:	warm	hot
WIND DIRECTION:	NE	NE

OBSERVATIONS MADE BY: Robin S. Shirley

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 2"
RECREATIONAL USAGE: fishing, camping

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/31/81	WATER COLOR:	grnsh-brn	grnsh-brn	brnsh-grn
	SEDIMENT:	slight	slight	slight
	ALGAE:	moderate	moderate	moderate
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	musty	fishy	fishy

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	clear
PRECIPITATION:	no rain	no rain
WAVES:	calm	calm
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:		

OBSERVATIONS MADE BY: Raymond McKinney

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, camping

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
9/10/81	WATER COLOR;	grnsh-brn	grnsh-brn	brnsh-grn
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	moderate	moderate	moderate
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	musty	fishy	fishy

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	clear
PRECIPITATION:	no rain	no rain
WAVES:	small	small
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:		

OBSERVATIONS MADE BY: Raymond McKinney

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, row boating/canoeing, camping

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

TABLE 4. FIELD OBSERVATIONS, LAKE CANTON, FULTON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/30/81	WATER COLOR:	grnsh-brn	grn-brn	brnsh-grn	CLOUD COVER:	clear	many clouds	WATER LEVEL OF LAKE: below normal 6"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	lt. rain	RECREATIONAL USAGE: fishing, power
	ALGAE:	minimal	minimal	minimal	WAVES:	small	moderate	boating
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	slight	minimal	minimal	WIND DIRECTION:	N	W	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	none	none				
					OBSERVATIONS MADE BY:	Raymond McKinney		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/15/81	WATER COLOR:	brnsh-grn	mod. brown	mod. brown	CLOUD COVER:	overcast	overcast	WATER LEVEL OF LAKE: below normal 10"
	SEDIMENT:	slight	slight	slight	PRECIPITATION:	lt. rain	no rain	RECREATIONAL USAGE: fishing, power
	ALGAE:	minimal	minimal	minimal	WAVES:	moderate	moderate	boating
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	SE	SE	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	none	leaves	none				
					OBSERVATIONS MADE BY:	Raymond McKinney		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/21/81	WATER COLOR:	grnsh-brn	grnsh-brn	grnsh-brn	CLOUD COVER:	hazy	hazy	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: none
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	slight	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	NE	NE	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	leaves	none	none				
					OBSERVATIONS MADE BY:	Robin Shirley Steve White		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR;				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

particularly at Site 3. The sediment load tends to settle out in the upper end of the lake so that the water becomes clearer towards the dam. As the sediment drops out, algae appear to become more of a problem, as evidenced by the change in water color from primarily brownish at Site 3 to more greenish color at Site 1.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Lake Canton (estimated at twice the Secchi depth) ranged from 2.2 - 10.0 feet at Site 1, 2.3 - 5.7 feet at Site 2, and 1.3 - 4.0 feet at Site 3. Since Lake Canton is deep enough to thermally stratify and had a euphotic zone that was generally less than the total depth, low dissolved oxygen values would be expected in the bottom waters.

In the absence of dissolved oxygen, substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese may accumulate in the bottom waters. These substances can contribute to serious taste and odor problems in drinking water if water supply is taken from near the lake bottom during summer stratification. When these substances are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Lake Canton, a medium sized public water supply reservoir in west-central Illinois, was sampled on 10 dates between April 15 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteers recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Lake Canton (23.3 inches) ranked 58th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). Above average rainfall during the sampling period may have resulted in a lower than normal transparency.

A spatial trend of increasing transparency from the headwaters to the dam was apparent in Lake Canton. Field observations indicate that transparency was influenced primarily by sediment in the headwaters and algae near the dam.

Lake Canton is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Lake Canton is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Pollutant contributions from urban storm drainage, septic tanks and fertilization of lawns should also be investigated and minimized.

In-lake management may also warrant consideration. Drawing oxygenated water from the upper strata for water supply use may help alleviate taste and odor problems. Aeration-destratification to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem causing blue-greens, help to alleviate taste and odor problems, and improve fishing.

Continued monitoring is recommended for Lake Canton. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

Illinois Department of Conservation. 1977. Illinois Inland Lakes Problems Assessment Data Form, filled out for Illinois Environmental Protection Agency, "Assessment and Classification of Illinois Lakes."

Illinois Department of Public Health. 1976. The Minimum Sanitary Requirements for the Design and Operation of Swimming Pools and Bathing Beaches. State of Illinois, Department of Public Health, Springfield, Illinois.

Illinois Environmental Protection Agency. 1982. Volunteer Lake Monitoring, 1981. A Cooperative Citizen - Illinois Environmental Protection Agency project. Monitoring Unit; Division of Water Pollution Control, Illinois EPA, Springfield, Illinois.

Illinois State Water Survey. 1924-1981. Lake Sedimentation Surveys. Hydrology Section, Illinois State Water Survey, Urbana, Illinois.

DS:jab/sp2161c

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

water retention time - water residence time; period of time a mass of water remains in an impoundment.

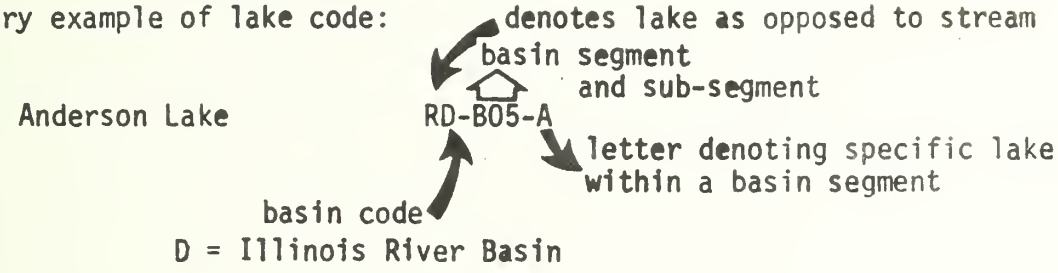
watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

ABBREVIATIONS AND SYMBOLS

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

CAMPUS LAKE, JACKSON COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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This is one of 87 reports prepared for lakes in the 1981 Volunteer Lake Monitoring Program. It represents the coordinated effort of many individuals.

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Campus Lake is a 40 acre impoundment owned by Southern Illinois University - Carbondale in Jackson County, Illinois. The lake was originally constructed by damming three streams in 1880, was last drained in 1957, and is now solely rainfed. It has a maximum depth of 14 feet, an average depth of 8 feet, and a storage capacity of 320 acre/feet (Table 1).

Campus Lake serves as a recreational lake used for fishing, swimming, row boating, canoeing, sailboating, powerboating, picnicking and waterfowl observation. Access is permitted for SIU students, family and friends who have identification cards. A boat dock serves as the access point.

The watershed drainage area of Campus Lake is estimated to be 70 percent woodland. The lake shoreline is also primarily wooded.

Aquatic weeds and water level fluctuation are considered moderate problems for the lake. Woodland runoff, cracks in adjacent sewer lines, urban storm drainage construction site runoff, fertilizer or pesticides from lawns, waterfowl, and sediment in the lake are cited as potential pollution sources. Grass carp are stocked every few years to control the algae. The beach area is chlorinated to insure safety of swimmers.

TABLE 1. LAKE ASSESSMENT SUMMARY, CAMPUS LAKE, JACKSON COUNTY, ILLINOIS (RN-A07ZN).

I. GENERAL INFORMATION

River Basin: Big Muddy
Segment: A07
Latitude:
Longitude:
Ownership: Southern Illinois University

Surface Area (Acres): 40
Watershed Area (Acres): 384
Maximum Depth (Feet): 14
Average Depth (Feet): 8
Storage Capacity (Acre/Feet): 320
Inflowing Stream(s): originally 3 streams dammed,
Outflowing Stream(s): none (rain fed solely)
Water Retention Time:
Lake Type: dammed stream
Year Constructed: 1880 last drained 1957

II. USAGE

Public Access: yes - SIU students with ID
Lake Usage:
Potable Water Supply: none
Industrial Water Supply: none
Agricultural Water Supply: none
Cooling Water: none
Recreation: heavy
Fishing: heavy
Swimming: light
Power Boating: light
Row Boating or Canoeing: moderate
Sailboating: moderate
Camping: none
Picnicking: moderate
Waterfowl Hunting: none
Waterfowl Observation: light
Other:

Recreational Facilities:
beach, picnic areas, boat launch and fitness path around lake

Shoreline Usage (Percent):
Urban (Including Streets): 3%
Residential (Including Lawns): 12%
Golf Courses:
Pasture or Grassland:
Woodland: 85%
Row Crops:
Wetland:
Other:

Watershed Usage (Percent):
Urban:
Residential: 30%
Golf Courses:
Pasture or Grassland:
Woodland: 70%
Row Crops:
Wetland:
Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: fair
Fishing: fair
Conditions and Extent:
Suspended Sediment: slight
Deposition of Sediment: slight
Algal Blooms: slight
Aquatic Weeds: moderate
Taste and/or Odor: slight
Water Level Fluctuation: moderate
Fishkills: slight
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
Sewage Treatment Plant Effluent:
Industrial Discharge:
Urban Storm Drainage: yes
Septic Tanks:
Pasture or Grassland Runoff: yes
Cropland Runoff:
Feedlot Runoff:
Construction Site Runoff: yes
Fertilizer or Pesticides from Lawns/Golf Courses: yes
Orchards:
Forestry Operations Runoff:
Mining:
Waterfowl: yes
Sediment in Lake: yes
Other: Woodland runoff; Cracks in adjacent sewage lines

V. LAKE MANAGEMENT

Comments: Grass carp are put into lake to control algae. The beach area is chlorinated to insure safety of swimmers.

*Information Supplied By Cindy Nolan (1981)

Assessment information on Campus Lake was provided by Cindy Nolan of the Pollution Control Department of SIU-Carbondale. Monitoring was performed by Susan O'Leary, Ken Wyatt, Dave Carney, Donna Cottam, Chris Jensen, Mike Lossau, Mike Salmond, Karen Layman, Rick Jaipien, Nicole Blase and Denise Swanson. Secchi readings and field observations were recorded at three sites (located in Fig. 1) on 13 dates in 1981: May 15 and 24, June 12 and 26, July 11 and 24, August 7, 19 and 24, September 2 and 16, October 7 and 21.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Campus Lake are summarized in Table 2 and plotted in Figure 2. Total depth data are presented in Table 3, while field observations are summarized in Table 4.

Transparency of Campus Lake

The average Secchi disc transparency of Campus Lake was 46.0 inches, which ranked 28th when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was about equal to four feet minimum recommended for swimming by the Illinois Department of Public Health (1976).

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Campus Lake ranged from a maximum of 102 inches at Site 1 on May 29 and June 12 to a minimum of 24 inches at Sites 2 and 3 on July 24 and August 24.

Differences in clarity were evident in different sections of Campus Lake. Transparency averaged 52.9 inches at Site 1 and 43.1 inches at Sites 2 and 3. Readings at all three sites were greater than the four feet minimum recommended for swimming only on May 29 and June 12.

There were seasonal differences in transparency of Campus Lake. Highest transparencies were recorded in late May and early June. Lowest transparencies were generally recorded in midsummer, and were probably the result of algal blooms.

FIGURE 1

CAMPUS LAKE

JACKSON COUNTY

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) CAMPUS/JACKSON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 15	42.0	42.0	36.0	40.0	3.5
05/ 29	102.0	84.0	90.0	92.0	9.2
06/ 12	102.0	84.0	90.0	92.0	9.2
06/ 26	48.0	36.0	42.0	42.0	6.0
07/ 11	42.0	48.0	42.0	44.0	3.5
07/ 24	-1.0	24.0	24.0	24.0	0.0
08/ 7	42.0	42.0	42.0	42.0	0.0
08/ 19	36.0	30.0	30.0	32.0	3.5
08/ 24	-1.0	24.0	24.0	24.0	0.0
09/ 2	36.0	36.0	30.0	34.0	3.5
09/ 16	42.0	30.0	36.0	36.0	6.0
10/ 7	42.0	38.0	38.0	39.3	2.3
10/ 21	48.0	42.0	36.0	42.0	6.0

SUMMARY STATISTICS

	SITES			LAKE
MEAN	52.0	43.1	43.1	46.0
STD DEV	24.6	19.5	21.7	21.7
MIN	36.0	24.0	24.0	24.0
MAX	102.0	84.0	90.0	102.0
AV DEPTH	12.6	8.5	8.5	

-1 = missing value

See glossary for explanation of Summary Statistics

TABLE 3

DEPTH OF SITE (FEET) CAMPUS/JACKSON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 15	14.5	11.5	11.5	12.5	1.7
05/ 29	13.0	8.0	8.0	9.7	2.9
06/ 12	13.0	8.0	8.0	9.7	2.9
06/ 26	13.0	8.0	8.0	9.7	2.9
07/ 11	11.5	8.0	8.0	9.2	2.0
07/ 24	-1.0	8.0	8.0	8.0	0.0
08/ 7	13.0	8.0	8.0	9.7	2.9
08/ 19	11.5	8.0	8.0	9.2	2.0
08/ 24	-1.0	8.0	8.0	8.0	0.0
09/ 2	11.5	8.0	8.0	9.2	2.0
09/ 16	11.5	10.0	10.0	10.5	0.9
10/ 7	13.5	9.5	9.5	10.8	2.3
10/ 21	13.0	8.0	8.0	9.7	2.9

SUMMARY STATISTICS

	SITES			LAKE
MEAN	12.6	8.5	8.5	9.8
STD DEV	1.0	1.1	1.1	2.2
MIN	11.5	8.0	8.0	8.0
MAX	14.5	11.5	11.5	14.5
AV DEPTH	12.6	8.5	8.5	

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) CAMPUS/JACKSON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

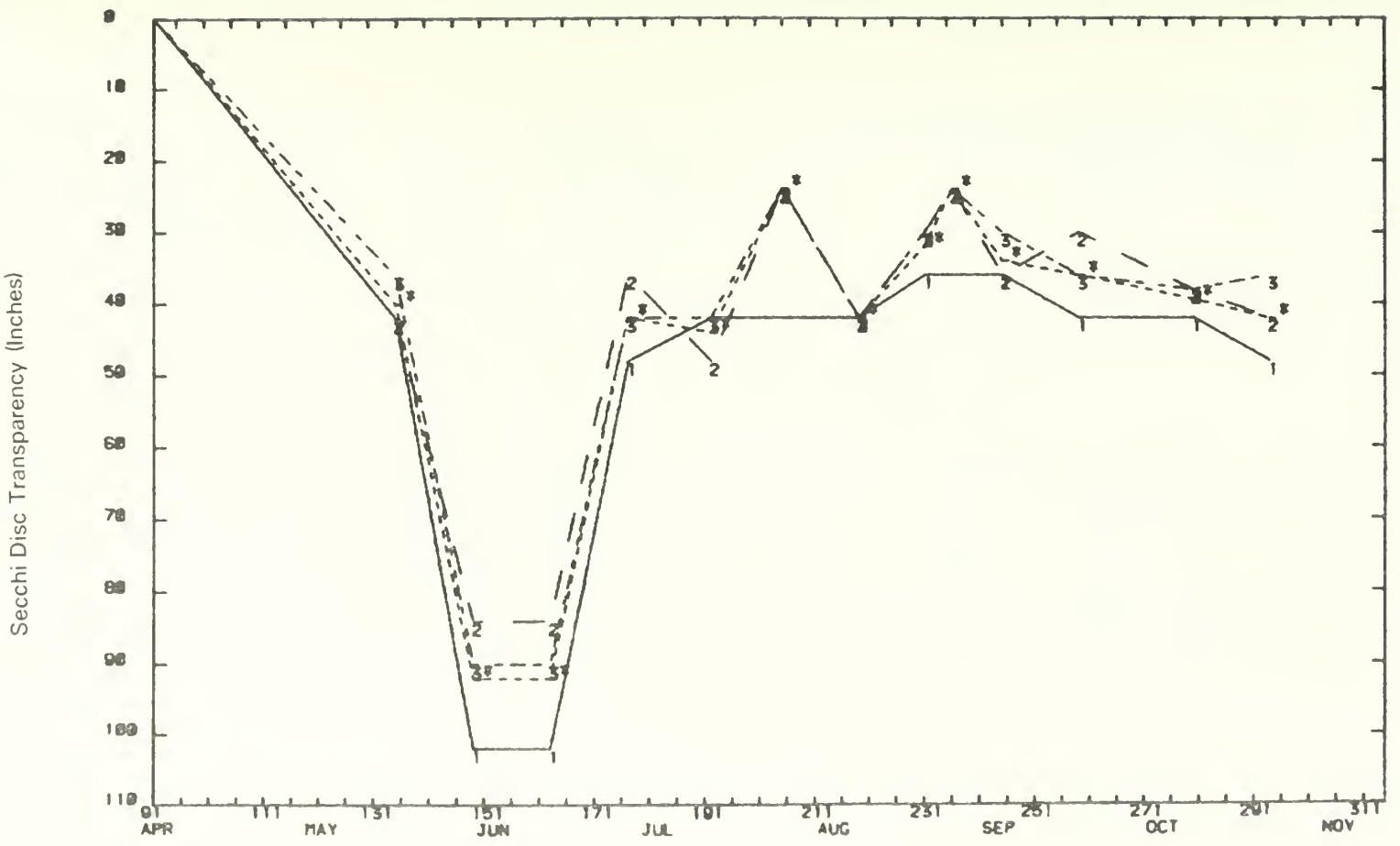


TABLE 4. FIELD OBSERVATIONS, CAMPUS LAKE, JACKSON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
5/15/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	few clouds	overcast	WATER LEVEL OF LAKE: above normal 2"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	v. lt. rain	RECREATIONAL USAGE: fishing, row boating/canoeing, sailing, picnicking
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	small	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	cool	
	WEEDS NEAR SHORE:	slight	slight	slight	WIND DIRECTION:	NW	W-Var.	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	none	duckweed	none				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Susan O'Leary		ADDITIONAL COMMENTS: Grass carp are present in lake as a weed control technique.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
5/29/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	few clouds	few clouds	WATER LEVEL OF LAKE: above normal 2"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: swimming, row boating/canoeing, sailing, picnicking
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot	
	WEEDS NEAR SHORE:	moderate	moderate	moderate	WIND DIRECTION:	SE	calm	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	none	none				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Susan O'Leary Ken Wyatt		ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
6/12/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	few clouds	overcast	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	v. lt. rain	RECREATIONAL USAGE: fishing, power boating
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot	
	WEEDS NEAR SHORE:	minimal	slight	moderate	WIND DIRECTION:	S	N	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	none	none	none				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Susan O'Leary Ken Wyatt		ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
6/26/81	WATER COLOR;	mod. green	mod. green	mod. green	CLOUD COVER:	clear	many clouds	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: swimming, power boating, sailing, picnicking
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot	
	WEEDS NEAR SHORE:	slight	slight	moderate	WIND DIRECTION:	NW	W	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	none	none	none				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Susan O'Leary		ADDITIONAL COMMENTS:

TABLE 4. FIELD OBSERVATIONS, CAMPUS LAKE, JACKSON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
7/11/81	WATER COLOR:	lt. green	lt. green	lt. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	none	waterfowl	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	many clouds
PRECIPITATION:	no rain	v. lt. rain
WAVES:	calm	ripple
AIR TEMPERATURE:	hot	hot
WIND DIRECTION:	calm	NW

OBSERVATIONS MADE BY: Susan O'Leary, Dave Carney

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, power boating
LAKE MANAGEMENT: none
ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
7/24/81	WATER COLOR:	lt. green	lt. green	lt. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	overcast
PRECIPITATION:	v. lt. rain	heavy rain
WAVES:	calm	small
AIR TEMPERATURE:	hot	warm
WIND DIRECTION:	N	SW

OBSERVATIONS MADE BY: Susan O"Leary, Donna Cottam

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: fishing
LAKE MANAGEMENT: none
ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/7/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	moderate	moderate
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	fishy	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	few clouds
PRECIPITATION:	no rain	no rain
WAVES:	ripple	calm
AIR TEMPERATURE:	cool	warm
WIND DIRECTION:	NW	W

OBSERVATIONS MADE BY: Donna Cottam, Ken Wyatt

OTHER COMMENTS

WATER LEVEL OF LAKE: below normal 12½"
RECREATIONAL USAGE: none
LAKE MANAGEMENT: none
ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/19/81	WATER COLOR;	mod. green	mod. green	mod. green
	SEDIMENT:	slight	slight	slight
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	moderate	moderate	moderate
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	hazy	few clouds
PRECIPITATION:	no rain	no rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	Var.	Var.

OBSERVATIONS MADE BY: Susan O'Leary, Chris Jensen

OTHER COMMENTS

WATER LEVEL OF LAKE: below normal
RECREATIONAL USAGE: fishing, power boating, row boating, canoeing, sailing, picnicking
LAKE MANAGEMENT:
ADDITIONAL COMMENTS:

TABLE 4. FIELD OBSERVATIONS, CAMPUS LAKE, JACKSON COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
9/2/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	none	waterfowl	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	hazy	overcast
PRECIPITATION:	lt. rain	heavy rain
WAVES:	ripple	moderate
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	W-NW	S-SW
OBSERVATIONS MADE BY:	Susan O'Leary Mike Lossau	

OTHER COMMENTS

WATER LEVEL OF LAKE: below normal 3"
RECREATIONAL USAGE: sailing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
9/16/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	hazy
PRECIPITATION:	no rain	v. lt. rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	NW	NW
OBSERVATIONS MADE BY:	Susan O'Leary Mike Salmond	

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: sailing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
10/7/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	overcast
PRECIPITATION:	no rain	no rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	NNE	NNW
OBSERVATIONS MADE BY:	Karen Lyman Rick Jaipien Susan O'Leary	

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: sailing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
10/21/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	slight	slight
	OTHER SUBSTANCES:	none	waterfowl	duckweed
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	clear
PRECIPITATION:	no rain	no rain
WAVES:	calm	calm
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	S.	S.W.
OBSERVATIONS MADE BY:	Susan O'Leary, Nicole Blase & Denise Swanson	

OTHER COMMENTS

WATER LEVEL OF LAKE: below normal 7"
RECREATIONAL USAGE: none

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

Field observations of the water color and amount of algae and sediment indicate that the transparency of Campus Lake is influenced primarily by the presence of algae. In general, a moderately green water color was observed during the periods of lowest transparencies, while a light green water color was noted on the dates of highest transparencies.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Campus Lake ranged (estimated at twice the Secchi depth) from 6-18 feet at Site 1, 4-14 feet at Site 2, and 4-15 feet at Site 3. Since Site 1 is deep enough to thermally stratify and had a euphotic zone that was generally less than the total depth, low dissolved oxygen values would be expected in the bottom waters of this site.

In the absence of dissolved oxygen, substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese may accumulate in the bottom waters. When these substances are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Campus Lake, an impoundment on the Southern Illinois University - Carbondale campus, was sampled on 13 dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteers recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Campus Lake (46.0 inches) ranked 28th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was about equal to the four feet minimum recommended for swimming by the Department of Public Health and was in the normal range for Illinois lakes.

Field observations indicated that the transparency of Campus Lake was influenced primarily by the presence of algae. Greatest transparencies were recorded in late spring, while lowest visibility was evident in mid-summer. Site 1 was generally clearer than the other sites.

Campus Lake is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Campus Lake is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of portions of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from cracks in adjacent sewer lines, septic tanks, fertilization of lawns, and waterfowl should also be investigated and minimized.

In-lake management may also warrant consideration. Aeration-destratification to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem causing blue-greens and improve fishing. Harvesting of aquatic weeds might also be considered.

Continued monitoring is recommended for Campus Lake. Consistent data gathered over a period of years is necessary to more fully document water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

Illinois Department of Conservation. 1977. Illinois Inland Lakes Problems Assessment Data Form, filled out for Illinois Environmental Protection Agency, "Assessment and Classification of Illinois Lakes."

Illinois Department of Public Health. 1976. The Minimum Sanitary Requirements for the Design and Operation of Swimming Pools and Bathing Beaches. State of Illinois, Department of Public Health, Springfield, Illinois.

Illinois Environmental Protection Agency. 1982. Volunteer Lake Monitoring, 1981. A Cooperative Citizen - Illinois Environmental Protection Agency project. Monitoring Unit; Division of Water Pollution Control, Illinois EPA, Springfield, Illinois.

Illinois State Water Survey. 1924-1981. Lake Sedimentation Surveys. Hydrology Section, Illinois State Water Survey, Urbana, Illinois.

DS:jab/sp3873C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

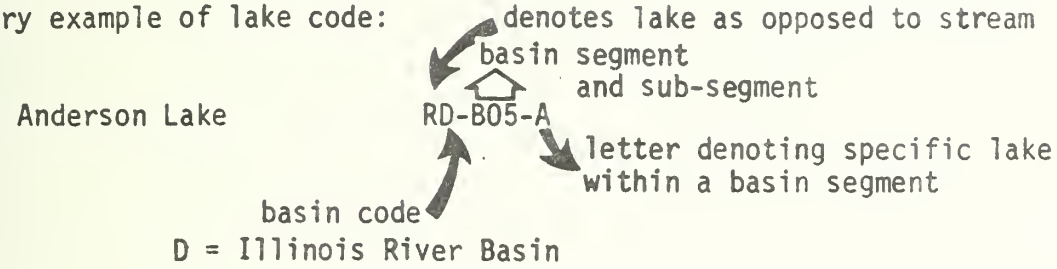
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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VOLUNTEER LAKE MONITORING PROGRAM SPRIN
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DIVISION OF WATER POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706

1981 VOLUNTEER LAKE

MONITORING PROGRAM REPORT

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

BRIARWOOD CENTRAL LAKE, DUPAGE COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

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Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have available a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Briarwood Central Lake is a 30 acre impoundment owned by Briarwood Community Association. It is located in DuPage County, 2 miles west of the Oak Brook Township Offices in Illinois. The lake, which was constructed in 1968 by damming Ginger Creek, has a maximum depth of 14 feet, an average depth of 5 feet and a storage capacity of 150 acre-feet (Table 1).

Briarwood Central Lake serves as a recreational lake used primarily for rowboating, canoeing and waterfowl observation. Access is limited to organization members only.

The 30 acre watershed of Briarwood Central Lake is estimated to be 90 percent residential. The lake shoreline is totally residential.

Deposition of sediment is considered to be a substantial problem in Briarwood Central Lake, while suspended sediment and taste and odor are considered moderate problems. Urban storm drainage, pasture or grassland runoff, construction site runoff, fertilizer or pesticides from lawns, waterfowl and sediment in the lake are cited as pollution sources.

Assessment and monitoring information on Briarwood Central Lake was provided by Frank M. Lhotka. Secchi disc depth, total depth, and field observations were recorded at three sites (located in Fig. 1) on 13 dates in 1981.

TABLE 1. LAKE ASSESSMENT SUMMARY, BRIARWOOD CENTRAL LAKE, DUPAGE COUNTY, ILLINOIS (RG-A07-N).

I. GENERAL INFORMATION

River Basin: Des Plaines
Segment: A07

Ownership: Riparian Rights-
Briarwood Community Assoc.
Surface Area (Acres): 13*
Watershed Area (Acres):
Maximum Depth (Feet):
Average Depth (Feet):
Storage Capacity (Acre/Feet): 65*
Inflowing Stream(s): Ginger Creek
Outflowing Stream(s): Salt Creek
Water Retention Time:
Lake Type: dammed stream
Year Constructed: spillway (1968)

II. USAGE

Public Access: no-organization member only
Lake Usage:
Potable Water Supply: none
Industrial Water Supply: none
Agricultural Water Supply: none
Cooling Water: none
Recreation: light
Fishing: light
Swimming: none
Power Boating: none
Row Boating or Canoeing: moderate
Sailboating: light
Camping: none
Picnicking: none
Waterfowl Hunting: none
Waterfowl Observation: moderate
Other:

Recreational Facilities:
4 docks

Shoreline Usage (Percent):
Urban (Including Streets):
Residential (Including Lawns):
Golf Courses:
Pasture or Grassland:
Woodland:
Row Crops:
Wetland:
Other:

Watershed Usage (Percent):
Urban:
Residential: 90%
Golf Courses:
Pasture or Grassland:
Woodland: 10%
Row Crops:
Wetland:
Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: poor
Fishing: good
Conditions and Extent:
Suspended Sediment: moderate (very turbid)
Deposition of Sediment: large (heavily silted)
Algal Blooms:
Aquatic Weeds: none
Taste and/or Odor: moderate
Water Level Fluctuation:
Fishkills: minimal
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
Sewage Treatment Plant Effluent:
Industrial Discharge:
Urban Storm Drainage: yes
Septic Tanks:
Pasture or Grassland Runoff: yes
Cropland Runoff:
Feedlot Runoff:
Construction Site Runoff: yes
Fertilizer or Pesticides from
Lawns/Golf Courses: yes
Orchards:
Forestry Operations Runoff:
Mining:
Waterfowl: yes (large pop. ducks and geese)
Sediment in Lake:
Other: large population of bullheads and carp

V. LAKE MANAGEMENT

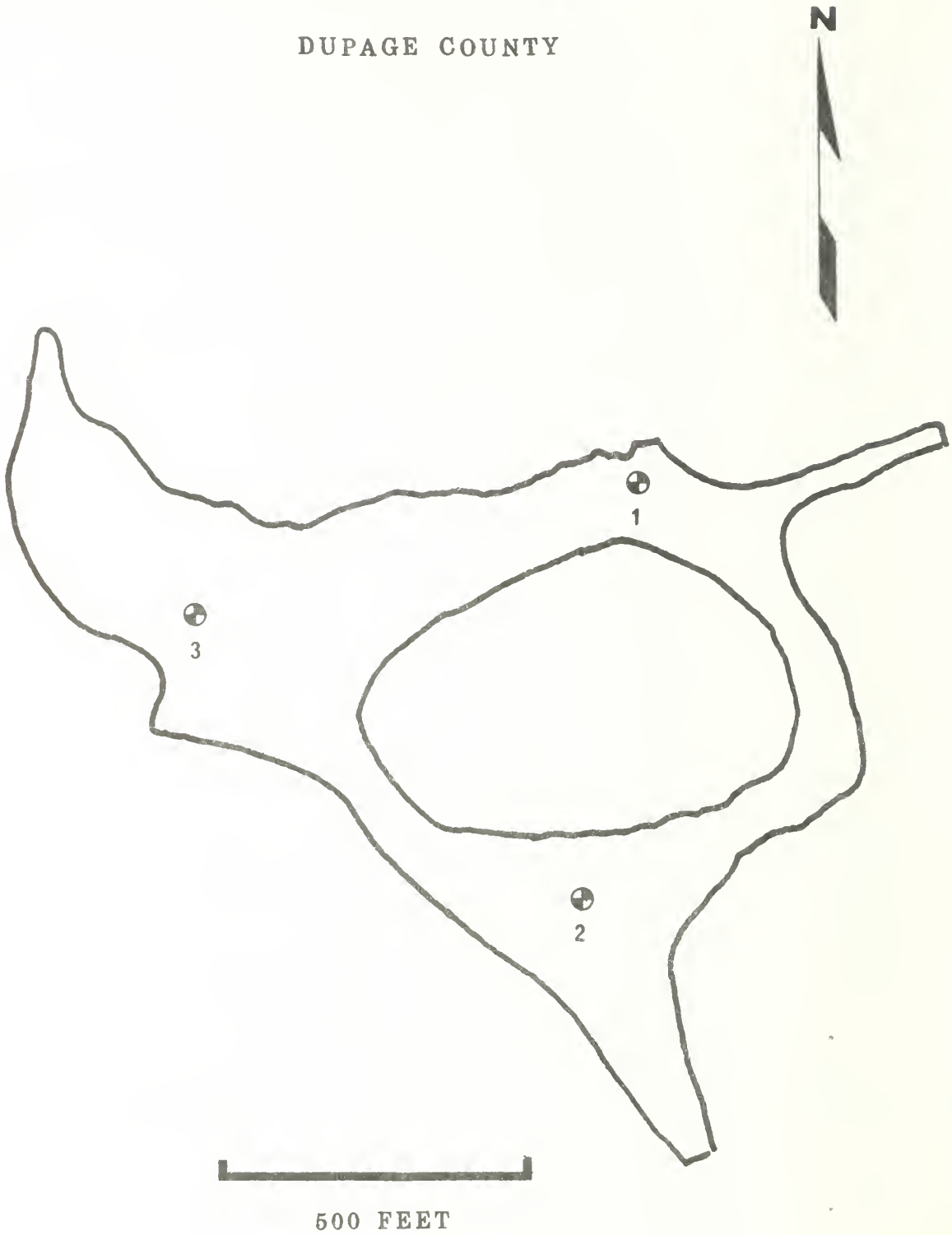
Comments: Shoreline riprapping, grading, terracing past 2 years to reduce erosion, no chemicals used

Information Supplied By Frank M. Lhotka, M.D. (1981); Illinois Department of Conservation (1969).

FIGURE 1

BRIARWOOD LAKE

DUPAGE COUNTY



RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Briarwood Central Lake are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Briarwood Central Lake

The average Secchi disc transparency of Briarwood Central Lake was 16.0 inches, which ranked number 71 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and in the range generally associated with use impairment problems for Illinois lakes.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Briarwood Central Lake ranged from a minimum of 6 inches at Site 3 on May 2 to a maximum of 34 inches at Site 1 on July 6.

Briarwood Central Lake was extremely turbid at all three sites throughout the May-October sampling. Averge transparencies were 17.4 inches at Sites 1 and 2, and 13.4 inches at Site 3. The low transparencies were probably related, in part, to the shallow depths of the sites (average depth 8.3 feet), resultant stirring up of sediment by wind and wave activity, and a relatively high input of nutrients and/or sediment.

Field observations indicate that the lack of transparency in Briarwood Central Lake was due primarily to suspended sediment. A brown water color was observed on most sampling dates and amounts of suspended sediment were generally noted to be higher than amounts of algae.

Relationship to Lake Uses

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) BRIARWOOD/DUPAGE COUNTY ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 2	8 0	7 0	6.0	7 0	1.0
05/ 22	18.0	22 0	14 0	18 0	4 0
06/ 25	22.0	21 0	15.0	19 3	3.8
07/ 6	34 0	32 0	28.0	31 3	3 1
07/ 24	18 0	19 0	11 0	16 0	4 4
08/ 7	13 0	12 0	10.0	11 7	1 5
08/ 17	17 0	17 0	11 0	15 0	3 5
09/ 7	19.0	18 0	15.0	17 3	2 1
09/ 18	15 0	17 0	11 0	14 3	3 1
10/ 9	15 0	13 0	15.0	14 3	1.2
10/ 19	12 0	13 0	11.0	12 0	1 0

SUMMARY STATISTICS

	SITES			LAKE
MEAN	17 4	17 4	13.4	16 0
STD DEV	6 7	6.5	5.6	6 4
MIN	8.0	7.0	6.0	6 0
MAX	34 0	32.0	28.0	34 0
AV DEPTH	8 5	9.4	7.0	

-1 = missing value

See glossary for explanation of Summary Statistics

TABLE 3

DEPTH OF SITE (FEET) BRIARWOOD/DUPAGE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 2	9 0	9.0	6 5	8 2	1 4
05/ 22	9 0	9.5	6 0	8 2	1 9
06/ 25	9 5	9 0	7 0	8 5	1 3
07/ 6	9 0	10 0	7 0	8 7	1.5
07/ 24	8 0	9 0	6 5	7.8	1.3
08/ 7	6 5	10 0	7.0	7 8	1.9
08/ 17	9.0	10 5	7 0	8.8	1 8
09/ 7	9 0	9 5	6 5	8.3	1 6
09/ 18	9 0	10 0	7.0	8.7	1.5
10/ 9	9 0	7 0	10 0	8 7	1 5
10/ 19	7.0	10 0	7 0	8 0	1 7

SUMMARY STATISTICS

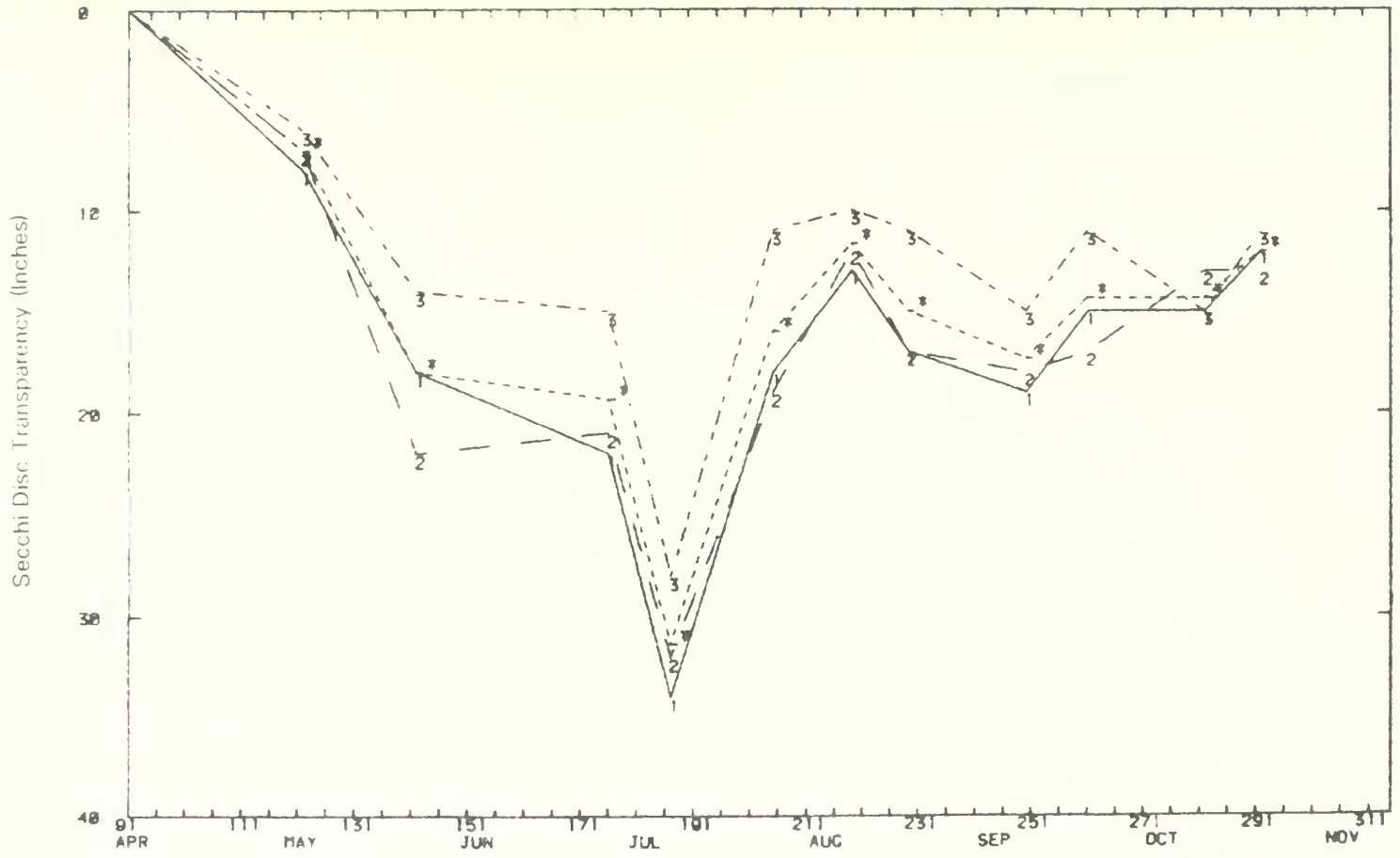
	SITES			LAKE
MEAN	8 5	9 4	7.0	8 3
STD DEV	1 0	0 0	1 0	1 4
MIN	6 5	7 0	6.0	6 0
MAX	9 5	10.5	10.0	10 5
AV DEPTH	8.5	9 4	7 0	

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) BRIARWOOD/DUPAGE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)



KEY

1 Site 1
2 Site 2
3 Site 3
* Mean (Average)

TABLE 4. FIELD OBSERVATIONS, BRIARWOOD CENTRAL, DUPAGE COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/2/81	WATER COLOR:	brnsh-grn	lt. brown	lt. brown
	SEDIMENT:	moderate	moderate	large
	ALGAE:	0	0	0
	WEEDS AT SAMPLE SITE:	0	0	0
	WEEDS NEAR SHORE:	0	0	0
	OTHER SUBSTANCES:	dead fish *waterfowl	*	refuse *
	ODOR:	no odor	musty	musty

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	overcast
PRECIPITATION:	no rain	v. lt. rain
WAVES:	calm	ripple
AIR TEMPERATURE:	cool	cold
WIND DIRECTION:	E	NE
OBSERVATIONS MADE BY:	Dr. Frank Lhotka	

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal
RECREATIONAL USAGE: fishing, row boating/canoeing

LAKE MANAGEMENT: none

ADDITIONAL COMMENTS: Rain 3 days ago, water remains murky 3-5 days

*detritus, clippings, sediment

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/22/81	WATER COLOR:			
	SEDIMENT:	slight	moderate	slight
	ALGAE:	minimal	0	minimal
	WEEDS AT SAMPLE SITE:	0	0	0
	WEEDS NEAR SHORE:	0	0	0
	OTHER SUBSTANCES:	* **	* + refuse	**
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	many clouds	clear
PRECIPITATION:	0	0
WAVES:	small	ripple
AIR TEMPERATURE:	warm	hot
WIND DIRECTION:	SW-15	SW-10
OBSERVATIONS MADE BY:	Dr. Frank Lhotka	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, sailing, construction on island

LAKE MANAGEMENT: none

ADDITIONAL COMMENTS: Water much clearer on this sampling - pH 7.75 in all three areas.

*sediment +grass clippings
**River willow

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/25/81	WATER COLOR:	mod. green	mod. green	very green
	SEDIMENT:	slight	slight	moderate
	ALGAE:	minimal	minimal	slight
	WEEDS AT SAMPLE SITE:	0	0	0
	WEEDS NEAR SHORE:	0	0	0
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl *
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	hazy
PRECIPITATION:	no rain	no rain
WAVES:	ripple	calm
AIR TEMPERATURE:	hot	hot
WIND DIRECTION:	W-15	SW-10
OBSERVATIONS MADE BY:	Dr. Frank Lhotka	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, picnicking bird watching

LAKE MANAGEMENT: none

ADDITIONAL COMMENTS: pH continues high by alkaline pH 7.75 - 8.0

*grass clippings & dead fish

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
7/6/81	WATER COLOR;	lt. green	mod. green	lt. green
	SEDIMENT:	minimal	moderate	slight
	ALGAE:	minimal	moderate	slight
	WEEDS AT SAMPLE SITE:	0	0	0
	WEEDS NEAR SHORE:	0	0	0
	OTHER SUBSTANCES:	waterfowl	*	waterfowl sediment
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	hazy
PRECIPITATION:	no rain	no rain
WAVES:	calm	ripple
AIR TEMPERATURE:	hot	hot
WIND DIRECTION:	N	E
OBSERVATIONS MADE BY:	Dr. Frank Lhotka	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, row boating/canoeing, sailing, feeding waterfowl

LAKE MANAGEMENT: no chemicals

ADDITIONAL COMMENTS: pH tests 7.75 in all 3 areas. Quite high - water clearest today in past 9 years for - summer

*refuse, clippings, algal mats, waterfowl, leaves

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
7/24/81	WATER COLOR:	lt. green	lt. green	mod. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	many clouds	overcast
PRECIPITATION:	no rain	no rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	hot	warm
WIND DIRECTION:	S	NE

OBSERVATIONS MADE BY: Frank M. Lhotka

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 4-6"
RECREATIONAL USAGE: none

LAKE MANAGEMENT: none

ADDITIONAL COMMENTS: Heavy rain 5 days
pH 7.75 8.0 1 & 2 #3 Why?

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/7/81	WATER COLOR:	brnsh-grn	brnsh-grn	lt. brown
	SEDIMENT:	slight	slight	moderate
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	waterfowl dead fish	waterfowl	waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	many clouds	overcast
PRECIPITATION:	no rain	lt. rain
WAVES:	ripple	calm
AIR TEMPERATURE:	warm	hot
WIND DIRECTION:	W	S

OBSERVATIONS MADE BY: Frank M. Lhotka

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 4"
RECREATIONAL USAGE: none

LAKE MANAGEMENT:

ADDITIONAL COMMENTS: 4" rain last 5 days, pH 7.5 to 8.0 at all 3 sites

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/17/81	WATER COLOR:	lt. brown	lt. brown	mod. brown
	SEDIMENT:	slight	slight	moderate
	ALGAE:	minimal	minimal	slight
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	*	*	* pollen
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	many clouds
PRECIPITATION:	no rain	no rain
WAVES:	calm	small
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	NE-12	NE-15

OBSERVATIONS MADE BY: Frank M. Lhotka

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 6"
RECREATIONAL USAGE: fishing, row boating/canoeing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS: pH readings 7.5 all sites

*clippings, waterfowl

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
9/7/81	WATER COLOR;	grnsh-brn	grnsh-brn	grnsh-brn
	SEDIMENT:	slight	minimal	slight
	ALGAE:	slight	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	waterfowl *	none	waterfowl leaves
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	clear
PRECIPITATION:	no rain	no rain
WAVES:	ripple	calm
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	W-15	E-10

OBSERVATIONS MADE BY: Frank M. Lhotka

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 4"
RECREATIONAL USAGE: fishing, sailing, row boating/canoeing

LAKE MANAGEMENT: none

ADDITIONAL COMMENTS: pH 7.75 at all sites, many ducks (60) geese (20-21) at site 3

*refuse & clippings

TABLE 4. FIELD OBSERVATIONS, BRIARWOOD CENTRAL, DUPAGE COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/18/81	WATER COLOR:	grn-brn	grn-brn	grn-brn	CLOUD COVER:	overcast	overcast	WATER LEVEL OF LAKE: above normal
	SEDIMENT:	minimal	minimal	slight	PRECIPITATION:	no rain	lt. rain	RECREATIONAL USAGE:
	ALGAE:	minimal	slight	slight	WAVES:	calm	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	N-10	NW-5	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	detritus *	detritus *				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Frank M. Lhotka		ADDITIONAL COMMENTS:

*"clippings" & waterfowl

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/9/81	WATER COLOR:	lt. brown	mod. brown	lt. brown	CLOUD COVER:	many clouds	few clouds	WATER LEVEL OF LAKE: above normal 6"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, row boating/canoeing
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	calm	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	SE	N	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	leaves waterfowl	leaves waterfowl	leaves * waterfowl				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Frank M. Lhotka		ADDITIONAL COMMENTS: pH 7.75 all 3 sites

*dead fish

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/19/81	WATER COLOR:	lt. brown	lt. brown	mod. brown	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: above normal 6"
	SEDIMENT:	moderate	moderate	large	PRECIPITATION:	no rain	v. lt. rain	RECREATIONAL USAGE: none
	ALGAE:	moderate	moderate	large	WAVES:	ripple	small	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cold	cold	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	W-10	NE-15	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	waterfowl leaves	waterfowl leaves	waterfowl leaves				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Frank M. Lhotka		ADDITIONAL COMMENTS: pH 7.5 at all 3 sites

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
11/1/81	WATER COLOR;	grnsh-brn	grnsh-brn	grnsh-brn	CLOUD COVER:	clear	few clouds	WATER LEVEL OF LAKE: above normal 6"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	S.	S-S.E.	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	water dead fish	water dead fish	water dead fish				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Frank M. Lotka		ADDITIONAL COMMENTS: pH 7.5 all 3 sites

TABLE 4. FIELD OBSERVATIONS, BRIARWOOD CENTRAL. DUPAGE COUNTY, ILLINOIS, 1981

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
11/8/81	WATER COLOR:	grnsh-brn	grnsh-brn	grnsh-brn	CLOUD COVER:	hazy no r	hazy	WATER LEVEL OF LAKE: above normal 2"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing row boating/ canoeing
	ALGAE:	minimal	minimal	minimal	WAVES:	calm	calm	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	LAKE MANAGEMENT: none
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	S.E.	S.	
	OTHER SUBSTANCES:	algal col. waterfowl	waterfowl leaves	waterfowl leaves	OBSERVATIONS MADE BY:	Frank M. Lotka		ADDITIONAL COMMENTS: pH 7.5 all 3 sites Water much clearer but color remains same
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Briarwood Central Lake (estimated at twice the Secchi depth) ranged from 1.3-5.7 feet at Site 1, 1.2-5.3 feet at Site 2, and 1.0-4.7 feet at Site 3. Since Briarwood Central Lake is so shallow (average depth 5 feet), the bottom waters probably remain oxygenated by mixing due to wind, regardless of the Secchi depth.

SUMMARY AND RECOMMENDATIONS

Summary

Briarwood Central Lake, a small, shallow, organizationally owned recreational impoundment in northeastern Illinois, was sampled on 13 dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Frank M. Lhotka recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Briarwood Central Lake (16.0 inches) ranked 71st of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was less than the four feet recommended for swimming by the Department of Public Health and was in the range generally associated with use impairment problems for Illinois lakes.

Briarwood Central Lake is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of sediment problems. Protection from further degradation is critical. If nutrient and sediment inputs were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Information on lake water levels is important for determining lake management strategies. Installation of a simple, but accurate, water level measuring device and frequent recording of lake water levels is recommended.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in identified source areas of the watershed, particularly those closest to the lake, may reduce nutrient and sediment transport to the lake. If the riprapping is finished, the lake shoreline will be more stable, reducing sediment input. Pollutant contributions from urban storm drainage fertilization of lawns, and waterfowl should also be investigated and minimized. Lake managers should consult the Illinois Department of Conservation about the large bullheads and carp populations in the lake.

Continued monitoring is recommended for Briarwood Central Lake. Consistent data gathered over a period of years is necessary to document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

Illinois Department of Conservation. 1977. Illinois Inland Lakes Problems Assessment Data Form, filled out for Illinois Environmental Protection Agency, "Assessment and Classification of Illinois Lakes."

Illinois Department of Public Health. 1976. The Minimum Sanitary Requirements for the Design and Operation of Swimming Pools and Bathing Beaches. State of Illinois, Department of Public Health, Springfield, Illinois.

Illinois Environmental Protection Agency. 1982. Volunteer Lake Monitoring, 1981. A Cooperative Citizen - Illinois Environmental Protection Agency project. Monitoring Unit; Division of Water Pollution Control, Illinois EPA, Springfield, Illinois.

Illinois State Water Survey. 1924-1981. Lake Sedimentation Surveys. Hydrology Section, Illinois State Water Survey, Urbana, Illinois.

DS:jab/sp3903C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

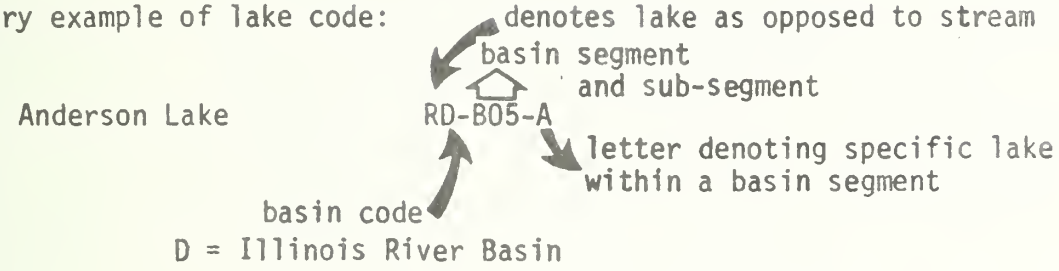
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

DS:sp,6207a,1-8

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